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“ in ”
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by G. H. Sherman M.D.

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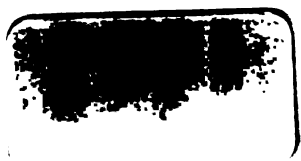
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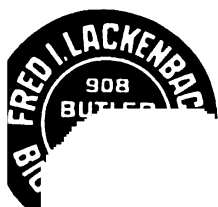
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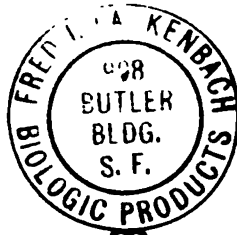




7.
Charles Ross Harvey

**VACCINE THERAPY
IN GENERAL PRACTICE**

... ..



VACCINE THERAPY IN GENERAL PRACTICE

BY

G. H. SHERMAN, M. D.

Editor of "The Bacterial Therapist"



CHICAGO
SUCCESSFUL MEDICINE, INC.

City Hall Square Building

1912

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PREFACE TO THE SECOND EDITION.

OVER A YEAR has passed since the first appearance of this book, and from the many encouraging letters and personal expressions of appreciation regarding the practical application of bacterial vaccines in general practice, I feel that, by including my added experience and observations coupled with extensive extracts from recent literature on this subject, this book may be equally well received.

The first edition of this book was produced at the request of many friends and was intended to serve as an easy means of answering hundreds of questions regarding vaccine therapy which were continually put to me. The edition consisted of 108 pages with additional chapters giving a list of the bacterial vaccines which are made in my laboratories. It was an attempt to educate the profession to a better knowledge of this method of treatment and it was anticipated that its distribution would have a favorable influence upon this part of my business.

However the study of bacterial therapy has been making very rapid strides in the past year and much new knowledge on this subject is now available. The gist of this has been gathered to-

gether here. The twenty chapters have now become thirty-seven and one hundred and eight pages are now three hundred and twenty-eight. The book has been entirely rewritten and much attention has been paid to the practical side of this study. No reference has been made to my products as this is done very satisfactorily in "Vaccine Therapeutics," a little book which is for free distribution and "The Bacterial Therapist," a monthly journal which I take pleasure in editing.

To avoid the slightest suspicion, on the part of those who may still be skeptically inclined, that I am over-enthusiastic in my conclusions, I have very frequently referred to other authors and have quoted them extensively, instead of making extracts.

The book has been divided into two distinct parts—The Theory and Study of Bacterial Inoculation and The Practical Application of Vaccine Therapy. The second part is virtually a clinic in applied bacterial therapy which has been purposely made as broad and unbiased as possible in order to avoid even an appearance of "manufacturer's enthusiasm." For this very reason many excerpts from current literature have taken the place of personal experiences and opinions. The addition of the Therapeutic Index will, it is hoped, make this book of much practical value.

I wish to acknowledge my sense of obligation to the authors from whose works I have so liberally drawn, and thanks are also due the many doc-

tors who have informed me of the results obtained in the treatment of their cases.

I also wish to extend thanks to my daughter, Mrs. Estelle Sherman Marty, and my son, Arthur, for their valuable aid in the bacteriological laboratory which has made much of this extensive work possible.

Detroit, Mich., May 10, 1912.

G. H. S.



PART ONE

THE THEORY AND STUDY OF BACTERIAL INOCULATION



CHAPTER I.

The Philosophy of Vaccine Therapy.

THAT CERTAIN DISEASES are communicable, and that in many diseases one attack renders the individual immune to subsequent attacks, has been known since the dawn of medicine; but it was left to our generation, through the development of the science of bacteriology, to work out the cause of disease and the nature of the immunizing mechanism. Through the science of bacteriology it has been demonstrated that a surprisingly large proportion of our diseases are caused by germs and that man's condition of health is maintained only by being able to successfully cope with the ever-present microorganisms. The ability to avoid or control infectious diseases is due to the workings of the defense organs by means of which a state of immunity is maintained or speedily brought about against the attack of pathogenic bacteria. The basic principle underlying vaccine therapy hinges upon this problem of immunity and affords a means of taking advantage of Nature's immunizing methods and utilizing them for prophylactic and curative purposes.

As a result of extensive research work, consisting of a large number of experiments on lower

animals conducted by numerous investigators, many of the changes taking place in the animal body during an infective process while establishing an immunity have been quite accurately worked out. Buchner, Nutall and others found that fresh normal blood serum has a bactericidal power, dissolving to a limited extent many kinds of germs. Park showed that with as many as 30,000 germs per cubic centimeter of fluid will all be destroyed by 0.1 c. c. of normal blood serum and incubating at 98.1 degrees F. for 27 hours; but by adding 100,000 germs to the same amount of serum, the number of germs will be very much diminished during the first and second hours of incubation but if the process of incubation is continued for 27 hours, the number of germs is materially increased, the remaining live germs having multiplied. This shows that normal blood serum contains something that is consumed while destroying germs and that if there are any germs left after this substance is consumed they will at once begin to multiply without further hindrance.

Ehrlich and Morgenroth found that this bactericidal power of fresh blood serum is due to the presence, in very minute quantities, of a variety of substances which they have termed inter-bodies which combine with another substance called the complement, present in comparatively large amounts. These inter-bodies fit a large variety of organisms, but when an animal is immunized to some specific organism the inter-bodies corres-

ponding to that organism are enormously increased, becoming the immune body while the amount of complement present remains practically stationary.

Since the germ-destroying power of the organism depends on the combination of the immune body with the complement, it can readily be seen that in cases of advanced infections the immunizing process may be retarded from a deficiency in complement.

Longcope (**University of Penn. Med. Bulletin**, 1902, XV, 331) in an investigation of the complement-content of the blood in infectious diseases in general has found that the complement is constantly low, and is diminished still more when septic complications intervene.

Gay, Perkins, Thompson (**Jour. Med. Research**, 1903, X, 196) found a diminished bacteriolytic complement constant in variola. Wasserman suggested ("Immune Sera" by C. F. Bolduan 1911, p. 81) that the curative power of many bactericidal sera might be increased by the simultaneous injection of the sera of certain normal animals, in order thus to gain an increased amount of complement.

In infections caused by exotoxic organisms such as the diphtheria and tetanus bacilli, distinct antitoxins are formed as the principal immunizing factors. In infections caused by the endotoxic pus group of organisms, of which the streptococci, pneumococci, staphylococci, colon bacilli, and ty-

phoid bacilli are the most important, the immune body or amboceptor expresses itself in the form of agglutinins, lysins, precipitins, etc.

Metchnikoff found that the white corpuscles play an important role in the immunizing process as phagocytes or "devouring cells," having the power to take up germs and destroy them by a process of digestion.

Sir A. E. Wright, of London, following up Metchnikoff's work, found that the phagocytic power of the white corpuscles was very slow or almost entirely negative unless they were suspended in blood serum and that when suspended in blood serum obtained from previously immunized animals the phagocytic power is much greater than when suspended in ordinary serum. He also found that this phagocytic power is specific, it only taking place when the same kind of germs are used in the experiment that the animal was immunized with. This is the fundamental principle underlying the whole of this subject.

From these investigations Wright concluded that the blood serum contains a substance that has a sensitizing effect on the invading organism and that this substance is naturally increased during the immunizing process. This bacteriotropic substance has been termed an opsonin (Latin, *opsono*, I prepare food for). It was this phagocytic power of the blood as demonstrated in the incubated test tube that led Wright to make extensive investigations as to the opsonic power of the blood in man

under various conditions. A measurement of this power he calls the "opsonic index," and he obtains it by the following procedure.

Procure a suspension of the organism to be tested for, by washing a twenty-four hour growth of this particular germ off an agar tube with an indefinite amount of normal salt solution. Shake the suspension well to avoid clumps. Collect some of the patient's blood from a finger prick into a glass tube suitable for hanging in a centrifuge. By the same process procure blood from a healthy person to serve as a control. Centrifuge the blood in both tubes. Pipet off the serum from each tube and keep them separate. Pipet off some white blood corpuscles and wash them in normal salt solution. Now with a capillary pipet take equal volumes of the bacterial suspension, white corpuscles and the patient's blood serum and mix them. With another capillary pipet take equal volumes of the bacterial suspension, white corpuscles and serum from the control blood and mix them. The mixtures are now drawn into their respective pipets and incubated for fifteen minutes. Slides are then made from each pipet and stained with a suitable blood stain (Wright's or Hastings's). The germs found in from 30 to 50 leucocytes on each slide are counted and the total number of germs estimated on each slide are then added together and divided by the number of leucocytes counted. This will give the average number of germs ingested by the leucocytes sus-

pended in the patient's serum which figure is compared with that found by the same procedure using the control serum. In this manner one obtains the patient's opsonic index, or a comparative measure of the germ-destroying power of his blood.

From this brief review of the immunizing process it becomes apparent that the process is somewhat complicated and no doubt many other important factors exist which have not yet been worked out. Which one of these various immunizing methods is the most important it is difficult to determine, except in diphtheria, tetanus and, perhaps, epidemic cerebro-spinal meningitis where distinct antitoxins are produced and even here it has been found that opsonins are formed during immunization.

Immunity may be natural or acquired. Natural immunity consists in some species being able to withstand pathogenic microorganisms that will attack others. Acquired immunity is one that may be established as a consequence of successfully combating an attack of pathogenic bacteria.

The first definite step in aiding Nature's immunizing process as a therapeutic measure was the application of antidiphtheric serum in treating diphtheria, as brought out by Behring. The results were so strikingly beneficial that the successful treatment of diphtheria with the serum method at once created the hope that other infectious diseases could be as effectively treated with the same method, but because of an inherent difference in

the immunizing process against other organisms, it has been found that animals cannot be immunized to a sufficient degree to make their serum efficient enough sufficiently early in the course of the infection for immunizing purposes.

Since it was found that serum therapy was not efficient in the treatment of infections caused by the pus group of organisms, quite naturally attention was directed toward hastening the establishment of an active immunity by bacterial inoculations. While Koch, Pasteur and others treated infections with bacterial products before Wright, yet it was his work of standardizing sterile bacterial suspensions, so the dose could be accurately measured, that placed bacterial vaccines on a practical substantial basis as a therapeutic measure.

It is important that the difference between serum and vaccine immunization be clearly kept in mind. When a serum is employed we inject under the skin ready prepared immune substances combined with the blood serum obtained from highly immunized animals to aid the patient in overcoming the infection. When a vaccine is employed, previously prepared and sterilized pathogenic bacteria suspended in normal salt solution are injected under the skin.

The question here naturally arises: How can sterile vaccines immunize? What effect can dead germs have on living ones when injected under the skin? The immunizing process is a more or less complicated one, but enough of it is understood so

that quite definite data may be obtained. By means of the opsonic index Wright conclusively demonstrated that during the immunizing process against pathogenic bacteria Nature automatically increases the opsonic power of the blood, resulting in a materially increased phagocytosis. He also found by taking the opsonic index at short intervals that when a sufficient number of previously sterilized pathogenic bacteria are injected under the skin during the course of an infection, the immunizing power of the blood is aroused, producing more opsonins and likewise resulting in an increased phagocytosis.

In many instances the natural immunizing process in a case of infection is too sluggish to prevent the infection from spreading. Under such conditions if vaccines are employed sufficiently early, the immunizing mechanism is aroused into activity and the establishment of an immunity is thereby hastened. From this it will be seen that the vaccines do not destroy the germs causing the infection, but simply stimulate the immunity-producing apparatus, thus eliminating in a greater or lesser degree the ill effects of the infection.

Further than this repeated opsonic readings showed that the increased germ-destroying power of the blood which resulted from a single dose of vaccine would continue from five to ten days or more, and that if inoculations are repeated at proper intervals, immunity would become permanent.

CHAPTER II.

Early Personal Experiences.

I HAVE BEEN in the general practice of medicine for twenty-seven years having come into practice just when medical thought was on the dividing line between the old conception and the new, while aseptic surgery was not yet in general use. I well remember seeing the first aseptic operations performed in Mercy Hospital and Michael Reese Hospital of Chicago.

I have been in practice long enough to remember the awful results of diphtheria before we had antidiphtheritic serum and was one of the first to use it in Detroit, having used some of Behring's imported serum before the domestic product could be obtained.

After seeing the brilliant results with antidiphtheritic serum I became a serum enthusiast and, like many another, expected that other infectious diseases could be treated in the same manner. I used some antitubercle serum and have also had an extensive experience with antistreptococcus serum having read papers before three different medical societies on the use of antistreptococcus serum in articular rheumatism. Sometimes the results with the serum seemed brilliant and at other times, negative. In acute cases my results

were generally good. In sub-acute and chronic cases the results were good if the case could be cured before the patient became sensitized to horse serum, the condition now known as anaphylaxis. When this occurred it was, of course, necessary that the serum treatment be discontinued.

I became attracted by Wright's excellent work and used staphylococcus aureus vaccine for the first time in a very bad case of palmar abscess in 1906; a case, by the way, that promised under ordinary treatment to result in a permanently crippled hand. The inflammatory process subsided promptly after the first dose of stock vaccine. A few more doses were given with the result that the hand was restored to its former usefulness.

The remarkable results in the case naturally aroused my interest. Not long after I had some streptococcus vaccine made at the Detroit Clinical Laboratory from a culture obtained from a case of tonsillitis.

Some of my patients suffering from rheumatism at that time had been showing signs of an anaphylaxis from the serum treatment, but had not recovered from their rheumatism. I began to use streptococcic vaccine in these cases and found that the results were not only more uniform and better than from the antistreptococcus serum, but all the disagreeable results of serum reactions (urticaria, anaphylaxis, etc.) were avoided, thus making it possible to treat cases for a much longer period of time.

By this time my reputation for curing rheumatism had extended beyond the limits of Detroit and out of town rheumatics would consult me. They were nearly always chronic cases which required treatment for some months. Usually they were not in a position to stay in the city for treatment, and such cases I always sent back to the family physician.

The vaccines not being regularly in the market I supplied my own to these physicians. In time I began to use vaccines for other purposes and, of course, recommended them to my professional friends. They began to use them. Out of town physicians who were treating my patients in this manner, recommended the use of bacterial vaccines to others and before I was aware of it I was in the vaccine business. I did not go premeditatedly into this business but was virtually dragged into it. Meantime I had fitted up a laboratory especially adapted to making bacterial vaccines. Not having time to do all the laboratory routine and attend to my practice at the same time, trained bacteriologists were employed to do the work.



CHAPTER III.

Vaccines in Every-day Practice.

THE SCIENCE OF BACTERIOLOGY has unravelled many of the mysteries which surround disease. While clinically we have an endless variety of diseases, biologically we have comparatively few. For example, we may have a bronchitis, iritis, neuritis, mastoiditis, tonsilitis, endocarditis, arthritis, cystitis, appendicitis, peritonitis, lymphangitis, otitis, erysipelas, septicemia, or even gangrene all caused by the streptococcus. Clinically these conditions are all different, yet biologically they can only be the same.

What is true of the streptococcus is equally true of the pneumococcus, staphylococcus, gonococcus, colon bacillus, tubercle bacillus and other organisms. In treating disease conditions with vaccines, treatment is directed at the cause of the trouble without regard to what part of the body may be involved. Thus the same vaccine is given in a case of rheumatic iritis that is used in a streptococcus-infected wound. If infective conditions were classified by the causative organism instead of the part of the body involved confusion would be avoided.

Mixed infections of two or more of these organisms are not uncommonly met with. When we re-

alize that the infections caused by these organisms are the common ailments encountered in the every-day practice of medicine it should not require much argument to show that vaccines should be applied as a routine in general practice. The use of medicines in these ailments is admittedly of questionable curative value; as palliatives and adjuvant measures they are valuable.

One great advantage in the vaccine treatment is that it is easily administered. The usual hypodermic method is used. The dose is not bulky and usually little or no local disturbance is caused where the inoculations are made. By this method of administration we are always sure that the patient gets just what we intend him to have. Inoculations being required only at moderate intervals, the patient rarely objects.

The advantages of this method of treatment are thoroughly appreciated by the average nurse or mother in treating infants and children. Everybody knows how difficult it is to give medicine to the little ones. A few doses of an indicated vaccine will frequently accomplish much more for the patient, and the bother of drugging the sick child, often with no effect whatever, is dispensed with.

Should vaccine treatment be left solely to those having laboratory facilities and who are trained bacteriologists? Or may not the general practitioner avail himself of the great advantages accruing from this method of treatment? In answering these questions it is necessary to consider what

the attending physician is expected to do. If he is expected to do bacteriological laboratory work and make his own vaccines before administering them, he necessarily should be familiar with that kind of work. Clearly that is no more necessary than that every doctor should make his own diphtheria antitoxin, strychnine, fluid extracts or any other remedies that he may care to use. He should have a general knowledge of how these things are made, but the technical knowledge belongs alone to the one who is trained in making them.

The essential element that counts for competency in a physician is his ability to discern clinical conditions and apply the appropriate remedy at the right time. In applying the remedy it is necessary for him to know what results are to be expected and how to interpret them clinically. This ability is only acquired by diligent and close observation in actual practice.

To use vaccines intelligently, a general knowledge of bacteriology and active immunization should be obtained. With the amount of current literature published on this subject there is absolutely no reason why the general practitioner should not be in possession of such knowledge; if not, he can with a little trouble acquire it. Clinical experience and his knowledge of how to observe the results of applied remedies, enables the general practitioner to readily take up the vaccine treatment and use it with results that are fully as good and sometimes even better than those ob-

tained by technical workers with less clinical knowledge.

The wide scope for the successful application of the vaccine treatment can only be appreciated by those having a large experience in its use. When we consider that most of our ailments have been traced to some germ, and that the majority of the common ones are caused by a small group of organisms, the tremendous influence for good that there is in this method of treatment, can be appreciated.

The practical value of a remedy depends largely on the prevalence of the ailment to which it is successfully applied. It is of more importance to have a good remedy for "colds" because they are very annoying and met with daily, than to have a remedy for sarcoma of the tibia. A cold is not as innocent an affair as it appears and this is seen all too often from what may follow it. The infecting organisms causing a "cold" may spread from the nose to the ear, mastoid cells, tonsils, bronchi and other parts of the body leaving in their wake a train of serious conditions.

The most prevalent ailments met with are caused by the pus group of organisms, staphylococci, streptococci, pneumococci, colon bacilli and gonococci. Conventional treatment with medicines in these infectious processes is of little practical value. Such remedies are not curative agents. At best they only give relief while Nature effects the cure. Vaccines, on the other hand, are real cura-

tive agents because they stimulate the immunizing mechanism of the body and thereby hasten the establishment of an immunity.

The inability to successfully cope with these infectious processes has been one of the chief causes which have brought the medical profession into disrepute in the estimation of many well-meaning people, and undoubtedly is responsible for much of our quackery and many of the innumerable patent medicines.

These conditions exist because the regular profession heretofore has not been able to accomplish enough. Bacterial vaccines will in a very large measure supply this want and restore an increasing confidence in the virtues of the medical profession.

The tedious estimation of the opsonic index as a means of determining the size of the dose and when to repeat the inoculation is now comparatively little used. As a scientific means to the study of immunization, it has been of inestimable value. With it the therapeutic value of bacterial vaccines has also been scientifically demonstrated, but as a guide to the administration of vaccines it is no more reliable than the clinical symptoms. To be of practical value the index should be taken at short intervals at least once daily during the course of an acute infection.

Since the estimation of the opsonic index is an elaborate technical procedure requiring special laboratory training and considerable time, this

places it beyond the possibilities of the busy practitioner and the financial ability of the average patient.

There are several reasons why the opsonic index is no more reliable than the clinical symptoms: First, the opsonins are not the only factors in the immunizing process; second, the opsonic power of the individual's blood used as a control may fluctuate; third, the technique is too elaborate to be exactly relied on; fourth, the individual taking the index must have a large experience in the work, a requirement not readily at hand.

The clinical symptoms to be relied upon as a guide are the temperature, rapidity and character of the pulse, the patient's feelings and expression, degree of swelling and inflammatory reaction in local infections and the amount of pain and suffering. The nearer these approach the normal the better the immunizing response.

Wright did some extensive index work to determine the relation of the immunizing power and pain. He found that during the inflammatory process there is always much pain until the immunizing powers are raised. I have often observed that the cessation of pain in an inflammatory process is the first indication of actual improvement after the administration of a bacterial vaccine. This is particularly noticeable in acute articular rheumatism.

A "positive phase" is a condition in which the

immunizing powers are sufficient to prevent the extension of an infection and ultimately to eradicate it. This condition may be brought about by the stimulating effects on the immunizing mechanism emitted from substances produced during the infecting process, or by the artificial stimulating effects on the immunizing mechanism resulting from bacterial inoculations.

The "negative phase," on the other hand, is a condition in which the immunizing powers are insufficient to cope with an existing infection. Wright has written extensively about the negative phase in its relation to therapeutic inoculations and seems to think it always follows after giving a dose of bacterial vaccines. He worked very extensively with tubercle vaccine after the use of which the negative phase is, comparatively speaking, more prominent than with any other germ, and is very marked unless exceedingly small doses are employed, tubercle vaccine being distinctly toxic. This is the probable reason that the negative phase idea fixes itself so firmly on his mind.

Bacterial vaccines employed in treating the pus group of infections are nontoxic unless used in tremendously large doses. For this reason large doses should be avoided until the patient has been under treatment for a short time and the effects of previous doses have been observed. In starting treatment with vaccines enough should be given to obtain a physiological immunizing response without the negative phase. Extensive application of

the vaccine treatment has resulted in adopting an appropriate adult dose with which to begin treatment. The dose should be repeated before the immunizing effect of the previous dose begins to wear off.

In acute infections, especially those caused by the streptococcus or pneumococcus, inoculations are advantageously made from one to two days apart, and in extremely bad cases even twice daily, until an immunizing response is obtained as shown by a drop in temperature and other improved conditions. After the extreme acute symptoms subside inoculations should be made at intervals varying from two to five days apart. If the temperature should rise again after material improvement has taken place another treatment should then be given.

In sub-acute and chronic infections inoculations should be made from three to seven days apart and the dose increased as indicated by the clinical symptoms.



CHAPTER IV.

Are Vaccines Dangerous?

TO THE UNINITIATED the question naturally arises, is there any danger in giving the vaccines? This question should only be answered by those having had an extensive and varied experience with them.

In this regard I am somewhat favorably situated, having used nearly eight thousand doses in my own practice in the treatment of acute and chronic cases. I have also supplied many thousands of doses to physicians with whom I am always more or less in touch by correspondence, and here in Detroit frequent consultations and daily inquiries and reports of cases by telephone have increased this experience.

In all of my work with bacterial vaccines I have never had a case where any harm resulted that could be attributed to the vaccine, nor have I had any complaint from the many physicians whom I have supplied with vaccines. My experience in this respect is abundantly verified by others who have had an extensive experience.

I will quote a few pointed paragraphs from an editorial on this subject: (Physiologic Therapeutics, I, 4, 190.)

“The growth of vaccine therapy—that most

wonderful addition to the possibilities of the work of the general practitioner—has been hampered to a considerable extent by a mistaken and exaggerated fear of the dangers of the so-called ‘negative phase.’

“Vaccines are not dangerous. This statement is made with all due deference to the feelings of many whose articles and statements we have read and heard. We qualify our statement by adding ‘if properly used.’ It is evident that the utilization of bacterial vaccines carries with it possibilities of harm; but no more so than the use of every drug in the *Materia Medica* and, for that matter, every procedure in physiologic therapeutics.

“In our opinion the majority of the profession, be more widely adopting vaccine therapy, would be doing themselves a benefit which would increase their control over many of the germ diseases (particularly those of a chronic nature) and incidentally add in a large measure to their professional prestige—and their remuneration.”

As a convincing object-lesson I also quote here several interesting paragraphs from an article on this subject by Professor Timothy Leary of Boston:

“These objections to the use of vaccines in infectious conditions seem to focus themselves against their use in general infections. They will, therefore, be considered here. The general harmlessness of vaccines is indicated by two cases of infection in which, through error, 10 cc. of staphy-

lococcus pyogenes aureus vaccine containing 10,000,000,000 organisms were injected at one time as an initial dose. In one case no untoward symptoms appeared. In the second there was a temporary collapse with prompt response to heat and stimulation. There are few powerful drugs in the pharmacopeia which could be used with such disregard for dosage without serious results.

“The most serious objection to the use of vaccines in general infections is that the patient is undergoing extreme intoxication. I have called attention to our theory of muscle immunity, and to the fact that physiological doses of vaccines are not followed by a toxic (negative) phase. The dose of vaccine used in pneumonia, for example, contains fewer organisms than will be found in a few out of the myriads of infected air sacs of the lung in this disease. The dosage is so infinitesimal, and its toxic effect is so slight, if any, that it is not measurable. As evidence that even much larger doses are at least harmless, I might cite the case of a child seven years undergoing an infection with pneumonia, with a temperature of 103 degrees and extreme meningeal symptoms, into whose body was injected, as an initial dose, 1,600,000,000 pneumococci. The standard dose for adults is 8 minims, or 100,000,000, pneumococci. This child, receiving sixteen times the adult dose of vaccine, not only did not show harmful results, but began to mend shortly following the initial injection and recovered under daily injections of several times the

usual adult dose. As second child with pneumococcus meningitis showed prompt diminution in the cerebro-spinal fluid, and sharp amelioration of symptoms accompanying the use of four to eight times the adult dose of pneumococcus vaccine."

Dr. W. H. Watters of Boston has this to say on the subject: "In general septicemia of streptococcus origin, we have frequently observed distinct amelioration following the hypodermic administration of bacterial emulsions, both autogenous and stock. This is by no means universal, however, some apparently hopeful cases finally succumbing to the disease. In even these fatal cases we can usually note clinically an increased degree of resistance on the part of the patient with a correspondingly prolonged fight before finally overcome. It is in puerperal septicemia, however, in which some of our most satisfactory results have been obtained."

In an excellent paper recently published Russell among other things says, that "Vaccination during the disease (typhoid fever) for therapeutic purposes, fails to reveal any evidence of a negative phase."

While the proofs of these pages are in my hands, my attention is called to a short and concise article on the subject of this chapter by Dr. Henry R. Harrower of Chicago (*Clinical Medicine*, March 12, pp. 301, 302.) This paper contains so many

convincing points in favor of vaccine therapy which have been emphasized by a number of pertinent quotations from recent literature, that I have asked and secured permission to reprint the article in toto:

Recently I had occasion to note, in the book-review department of the December number of your most excellent journal, (*Clinical Medicine*, Dec. 1911, p. 1340), some statements regarding the dangers of vaccine therapy, to which I wish to take exception.

You write: Vaccines have a greater possibility for harm than chloroform, morphine, strychnine, and other drugs of the kind. They are not dangerous in the hands of men who have studied their actions and the principles underlying their application, because then their administration is controlled.

While I have every respect for the abilities of the editor, and, too, for his clinical experience, I cannot but differ with him materially in this respect. To put it very plainly, vaccines are not dangerous. This statement is made with all due deference to the feelings of many whose articles or statements I have read or heard. I will qualify this statement by adding "if properly used." It must be evident that any agent, to be therapeutically valuable, must carry with it possibilities of harm if its use is overdone, just as too much bread or too much butter will make a man sick.

It is a fact that there is as little possibility

for harm in the bacterial vaccines as in any drug in the materia medica, and statements calculated to scare the profession are unfortunate, because vaccine therapy contains within it such tremendous possibilities for good. No step has been made in therapeutics during the past ten years that has been anything like as important as the work first done by Wright—no, not even salvarsan.

The only way in which I can reconcile your statement is to suppose that you must be considering tuberculin as a vaccine, and, of course, as tuberculin is a toxic product and not really a vaccine at all (which latter are given in cases where the patient is already fairly saturated with similar toxins) the possibilities for danger from its careless or unwise administration are very great.

Fortunately, the literature on vaccine therapy is becoming quite voluminous and covers practically every phase of this broad subject. I have collected a few excerpts from recent literature, which may serve to prove my contention, that vaccines, when used with the care that is possible by a physician who knows enough to know how to use drugs (even though he may know nothing about vaccine therapy), are not dangerous.

Doctors Williams, Cragin, and Newell ("Transactions of the Congress of American Physicians, Vol. 7, 1910, p. 160) say: "As the ordinary localized puerperal infections, irrespective of the

nature of the offending bacteria, tend to spontaneous cure, the field for vaccine therapy is practically limited to acute general infections, where it unfortunately appears to be of little value, and the most that can be said from the reports thus far available is, that its employment does no harm."

Dr. Henry O. Riek concludes: "Fifthly, that, if used with reasonable care as to dosage, and especially as to asepsis, vaccine therapy is a harmless measure and carries with it practically no serious risks."

Drs. J. B. Deaver, J. C. DaCosta, and D. B. Pfeiffer make this statement: "As a contraindication to vaccine treatment conducted in this manner, we can only mention one, namely, overwhelming sepsis. It is not rational to expect help in such a condition, and from the nature of the case it is possible to do harm by adding more toxin, though we have not seen an instance of this clinically."

Dr. W. R. Allen, London ("Vaccine Therapy," 3rd edition, p. 117), in referring to the treatment of pneumonia with vaccines, says, among other things: "A weak, irregular, very rapid pulse, enfeebled constitution, low muttering delirium, dry, furred tongue, and sordes about the mouth are, of course, unfavorable signs; yet so marked has been the improvement, even after one injection, in two cases of this type, that no case is to be looked upon as hopeless."

Dr. John H. Mudgett (**Medical Council**, Jan., 1912, p. 7) writes: "Finally, I desire to again emphasize the ease and facility with which bacterial vaccines may be used by the general practitioner; and also wish to state, from my own large experience and from information obtained from reading, my opinion, that the use of bacterial vaccines is as safe as the employment of any of the potent drugs of the materia medica. They should be used by every practitioner of medicine as an accessory to his other methods of treatment."

Dr. J. G. Callison, discussing typhoid fever (**Post-Graduate**, July, 1911), declares: "When given in therapeutic doses, such stock vaccines are without injurious effect, and do not interfere with other treatment."

Dr. R. H. Dennet (**Post-Graduate**, July, 1911) in referring to a case of typhoid fever, says: "The case was a very desperate one, but after the use of the vaccine went on to a complete recovery. The large dose this patient received certainly did no harm."

Dr. James M. Phalen (**Journal of the American Medical Association**, Jan. 6, 1912, p. 11), after reviewing the literature on the subject of typhoid-fever treatment with vaccines, says: "All agree, however, that even in cases in which it causes no improvement, it has done no harm."

An interesting experience is related by Dr. Timothy Leary, of Boston (**Boston Medical & Surgical Journal**, Oct. 1910), which is quoted in his

own words: "In general infections vaccines are harmless. This was indicated in a case in which, through error, 10 Cc. of staphylococcus pyogenes aureus vaccine containing 10,000,000,000 organisms were injected at one time, as an initial dose. No harm resulted. In a second case the same dose produced a temporary collapse, with prompt response to heat and stimulation."

To close: Bacterial vaccines are not dangerous—if rightly used. The average physician is passing by a splendid thing if he is not using these remedies as a routine. The knowledge required to use vaccines effectively is not hard to obtain, nor does it require more than a few minutes—perhaps an hour or so—and if there is danger, it lies more likely in **not** using bacterial vaccines when they are indicated.



CHAPTER V.

The Fear of the Negative Phase.

SO MUCH HAS BEEN SAID about the importance of avoiding the negative phase while using bacterial vaccines, especially in the treatment of severe acute infections, that an impression has been left among many physicians that the vaccine treatment is a hazardous procedure and should only be used as a last resort in exceptional cases.

The fear of the negative phase is largely due to Wright's extensive work with tuberculosis. His experiences were of such a character that he was forced to point out that tuberculin is very toxic if given in cases of tuberculosis where the system is already burdened with tuberculins resulting from the infective process; and that during the prolonged depressing effect of an over-dose the disease makes more rapid progress than otherwise.

Inferentially many physicians feared that similar depressed conditions might follow the use of bacterial vaccines, possibly an aggravation of the disease especially if used in acute infections. Occasionally some expressions still find their way into current medical literature which bring forward the dangers of the negative phase as applied to acute non-tubercular infections, regardless

of the overwhelming clinical evidence that bacterial vaccines are not only harmless but nearly always beneficial in such cases, especially so when used early. I cannot but believe that such statements are based on theoretical considerations only.

From a careful search of the literature on this subject I fail to find a single instance where any writer reports that any harm was done by the administration of bacterial vaccines in acute infections. Some may contend that cases in which the treatment was harmful are not always reported. For the sake of argument we will grant it. I believe that I am somewhat favorably situated to determine the real situation in this matter. For years I have been supplying many thousands of doses of vaccines to other physicians, and while there may be a natural desire to refrain from reporting unfavorable cases, it is equally certain that if harmful results had been observed from the use of any of these vaccines, as the responsible party, I would have heard of it.

Repeatedly I have used large doses of purely empiric vaccine in acute cases, where such prompt action was of advantage to the patient and no definite diagnosis was available at the time. Never have I had even as much as an unpleasant effect in any of these cases, nor have I heard from any of the many hundreds of physicians who have used my vaccines that harm has followed their administration, in spite of the fact that I have sought diligently for adverse reports.

From this I do not wish the reader to infer that bacterial inoculations may be given with impunity and with no knowledge of the value and physiology of an ordinary-sized dose. Guarded by the single dose ampule method, however, it is impossible for any one inadvertently to give more than the regular dose and cause trouble.

This fear of the negative phase, coupled with the notion that there may be other possible dangers in using vaccines, has, unfortunately, resulted in unnecessarily delaying the general application of vaccine therapy in the treatment of the acute infectious diseases, resulting in the loss of many lives that could have been saved and the prolonging of much unnecessary suffering in many diseases amenable to this treatment.

If, in a case of prostration with a weak, rapid pulse due to a general streptococcic infection, the patient should die after receiving a dose of streptococcus vaccine, would that be any argument that the vaccine was harmful? Such cases usually die under any treatment; but if such a case should recover or the life be prolonged, the least that could be said is that the vaccine did no harm. I have seen practically hopeless cases of puerperal infection recover under the vaccine treatment, while in other advanced cases no benefit was obtained.

Extensive observation has convinced me that the immunizing response after an inoculation of a vaccine, differs from that resulting from an advancing infection. Advancing infections, espec-

ially those due to the streptococcus, are distinctly toxic as shown by the rise of temperature, rapid pulse and often severe pain, headache and constitutional depression. Nothing of the kind is observed after a dose of streptococcus vaccine. If given to a healthy individual absolutely no disagreeable constitutional effect is noticed and the local reaction where the injection is made is usually no more than that resulting from a dose of sterile water. If this same dose is given to a case having a streptococcic infection, instead of increasing the toxic symptoms, very often shortly after the inoculation the patient begins to improve noticeably.

The following case is a splendid illustration: A woman in ordinary health cut her thumb slightly while paring fruit. The cut was so small that it was disregarded, and not even bandaged. She dressed some chickens and infected the wound. The next day, September 12, when I saw her, the thumb was badly swollen, cyanotic and very painful. A red lymphatic streak extended to the shoulder with the glands at the elbow badly swollen. The temperature was 100 degrees. Clinical symptoms indicated an unquestionable streptococcic infection. Since it was a skin involvement where staphylococci are usually also found, I gave a mixed vaccine containing 30,000,000 streptococci and 100,000,000 each of staphylococcus albus and aureus without waiting for a bacterial examination. By the next day, September 13, the tempera-

ture was normal, the red lymphatic streak reaching below the elbow. The thumb was still painful and swollen, the glands at the elbow were slightly more swollen but not so painful. By September 14, the inflammation on the arm was still present at the elbow glands and tissues around them, temperature normal, thumb swollen and painful. I repeated the dose of mixed vaccine. The following day, September 15, the swelling at the elbow with involved glands was rapidly diminishing and in a few days later had entirely disappeared. The thumb was still much swollen and cyanotic, the nail being blue. Around the point of infection a distinct line of demarcation appeared showing a gangrenous patch three-eighths of an inch wide and five-eighths of an inch.

The local treatment from the start consisted in keeping the thumb wrapped in a gauze bandage which was kept continually saturated with a 1-4,000 bichloride solution. This kept the feverish skin moist and at the same time acted as an antiseptic. An interesting point in this connection serves to show how little value local antiseptics really are when the infecting process has gone beneath the skin. On September 18, the dose of vaccine was again repeated. Three days after this the hand became somewhat swollen and by September 22 the temperature had again gone to 100 with much local pain. On this day 50,000,000 streptococcus and 100,000,000 each staphylococcus aureus and albus was given. On the 23rd the tem-

perature was normal, but unmistakable signs of pus appeared in the space between the thumb and hand. A small incision was made and about one drachm of pus allowed to be discharged. After this the case progressed favorably with the exception of the gangrenous portion which required ten days to separate and come out. The slough extended down to the periosteum. The wound granulated over rapidly and healed, and the thumb was restored to its former usefulness.

The infection in this case was an exceptionally virulent one. Any one who has had any experience with a streptococcus that will cause gangrene within the first few days of an infection, knows that under the conventional treatment this patient would have at least lost her thumb, probably her arm and possibly her life.

The prompt relief of toxic symptoms with reduction of temperature and also of the inflammatory process along the arm after a dose of stock vaccine shows not only the therapeutic value of the vaccine but also demonstrates that there is a distinct difference in the action of the vaccine on the immunizing mechanism as compared with that due to the progressing infection.

The infection made an impression distinctly toxic in effect, while the inoculation of dead organisms made no toxic impression but rather had a rapid immunizing effect. Instead of increasing the toxic condition the vaccine is instrumental in eliminating it. If the toxic element in the infective

process is the one that stimulates the immunizing mechanism, as many contend, a time would inevitably be reached in every acute infective process where the immunizing apparatus would be sufficiently stimulated to bring about an immunity, but in actual practice we often find the reverse to be the case. Instead of the patient becoming immune to the infecting organism he dies, not from tissue exhaustion, but from toxemia or paralysis of the nerve centers.

In practice we find that it is in the very toxic cases than an infection spreads most rapidly. This in itself would indicate that other factors beside the toxic element are essential in the immunizing process. In typhoid immunization experience teaches that old nontoxic cultures answer the best purpose for making vaccines; the proteid and not the toxic radical of the organism possessing the immunizing influence.

There seems to be a toxic element in these cases that not only has no beneficial influence on the immunizing mechanism, but actually hinders it. This seems to explain why it is that vaccines are most efficient when given early in the course of an infection. In the case referred to above it is probable that if the administration of the vaccine had been delayed one or two days there would have been enough toxic material absorbed to cripple the immunizing mechanism altogether. The toxic materials being produced in superabundance, so irritate the surrounding tissue that they thereby

hinder the absorption of the substances needed to stimulate the immunizing mechanism.

On the other hand, with the use of vaccine, enough dead organisms are thrown under the skin elsewhere to produce a reaction; but not enough inflammation is produced to prevent the absorption of the substances which stimulate the immunizing faculties of the system.

Any one having a large experience with bacterial vaccines can not help being impressed with the marvelous disappearance in many cases of an inflammatory process after a single inoculation. All this cannot very well be ascribed to the vaccine. It is more reasonable to suppose that after the immunizing mechanism has been sufficiently stimulated by the vaccine to retard the inflammatory process, that additional immunizing stimuli are set free from the infected area. This unlocking, as it were, of immunizing substances in an inflamed area after the swelling subsides, probably also explains why diseases like pneumonia so often recover by crisis.

This combined effect of the vaccine and the immunizing influence of the inflammatory process making a double impression on the immunizing mechanism, explains, to my mind at least, why it is that in many cases an immunity established after using vaccine is more permanent than one that comes about in the natural course of disease. This is particularly noticeable in rheumatism, furunculosis, tonsilitis, ordinary colds, etc.

Wright contends that the therapeutic value of vaccines is due to the formation of immunizing substances at the point of inoculation which are absorbed into the general circulation to influence conditions in remote parts of the body.

A notable exception to this quite general action of vaccines is the action of tuberculin (either T. R. or B. E.) which is quite toxic in cases of tuberculosis. It must be given very cautiously and in extremely small doses at comparatively long intervals to avoid a negative phase.



CHAPTER VI.

How to Begin the Use of Vaccines.

THIS IS A VERY IMPORTANT MATTER, as a mistake made at the beginning often discourages the physician. There is much truth in the old adage: "Well begun is half done." Too much stress cannot be placed on the necessity for the beginner to be reasonable, I repeat, "Vaccines are not cure-alls."

The selection of the first case is of great importance. Frequently when a physician considers using vaccines for the first time he looks up some old, hopeless case and considers it a good one on which to "try them out." At times in such cases he will be most agreeably surprised by the results, but often no benefit will be obtained. It is the "trying out" of the vaccines in such cases that leads physicians to say that they "have tried them, but could see no benefit."

The therapeutic value of vaccines can no longer be questioned, but because of this we must not conclude that they are infallible. While as a rule results are brilliant, now and then we meet a case in which no benefit is obtained even when autogenous vaccines are employed. This condition is sometimes found in chronic infections. It seems that in such cases in consequence of frequent autoinocula-

tions the immunizing mechanism is worn out and fails to respond to the stimulating influence of the vaccine.

Wright has pointed out that some of these failures in long-standing localized infections are due to the large amount of inflammatory products surrounding the infected area, thus impeding the free access of blood serum. In such cases he recommends Bier's bandage and other local treatments calculated to modify the circulatory conditions, in conjunction with the vaccine treatment.

Wright also points out that the opsonic index is often raised after a massage treatment in infective inflammatory processes. He argues that in such cases the massage causes a setting free of germs from the inflamed area which thus acts as an auto-inoculation.

In using bacterial vaccines the important question that always confronts us is: What is the infecting organism? The first reply that suggests itself is: Make a bacterial examination. But this is often impossible. In many instances the infection is of such a nature that the germ cannot be procured. The following case is a good illustration:

A young man applied for treatment, having enlarged lymphatic glands above the elbow and in the armpit. Two glands above the elbow were as large as medium-sized hickory nuts, while the one in the armpit was not quite so large. They were very tender and had been noticed only three days.

There was no red chain connecting them. The temperature was $99\frac{1}{2}$. Search for the source of infection showed a small scratch in the palm of the hand received five days previously; but it had healed over and a bacterial examination was impossible. By waiting until these glands suppurated a bacterial examination could have been made by procuring some of the pus, but that would do the patient no good.

By using a little judgment an approximate diagnosis was arrived at. The clinical symptoms indicated a streptococcus infection, but a staphylococcic infection was also likely as this organism is invariably present on the skin. Consequently a mixed vaccine consisting of 30,000,000 streptococcus pyogenes and 100,000,000 each of staphylococcus pyogenes aureus and albus was given. Improvement began within twenty-four hours after the inoculation and in five days the swelling in the glands had entirely disappeared. The recovery was complete without any further treatment.

No one can know what the consequences in this case might have been had the vaccine not been used. It was certainly better to head off the infecting process by giving vaccines, than to neglect it until an exact diagnosis could be made.

Take another instance: A man tramped on a nail. Forty-eight hours later, when I was called, the foot was badly swollen and very painful, but the inflammation was on the top of the foot and not where the nail entered. The small opening was

practically closed. His temperature was 100. Bacterial examination here would have been of no diagnostic value because the germs found at the point where the nail entered might not be the same as those causing the infection. Clinical symptoms indicated either staphylococcus, streptococcus or a mixture of both organisms. A mixed streptococcus and staphylococcus vaccine was accordingly given. In twenty-four hours his temperature was normal with the inflammation receding. Two days later another dose of the same vaccine was given. He made a prompt recovery and all signs of the trouble abated in a few days.

Every one who has had any experience in midwifery looks with apprehension on a rise of temperature, associated with headache and rapid pulse a few days after confinement, fearing he may have a streptococcus infection to deal with, no matter how carefully aseptic precautions may have been carried out. A streptococcus infection in the puerperal state is a serious matter and should be controlled as soon as possible. To verify the diagnosis by a bacterial examination of the uterine discharge means delay, even in institutional practice where facilities for such work are close at hand. A smear may be examined, but the bacterial condition cannot be definitely determined until a culture is incubated and examined. This means at least from 12 to 18 hours delay. In general practice the delay is even greater. Under such circumstances is it ad-

visable to postpone vaccine treatment until a positive bacterial diagnosis can be made?

Such a procedure is not advocated in treating diphtheria with antidiphtheric serum. La Play's recommendation (**Progressive Medicine**, March, 1907, p. 127) is quite generally practiced. It is: "Do not wait for a report on the culture. Use the antitoxin at once and freely; in this way not only will the mortality be reduced, but the complications will be less severe and less frequent."

The same rule applies with equal force in puerperal infections. Delay is altogether too dangerous. On the other hand a dose of vaccine is quite harmless even should no corresponding infection exist. Some one may object on the ground that such procedure is not strictly scientific, because other organisms may be present. It is granted, but the streptococcus is the one organism (with the very rare possible exception of the diphtheria bacillus or the tetanus bacillus) that should be guarded against and it is only by giving streptococcus vaccines **early** that this can be done. If other organisms are suspected of being present also or are later demonstrated by microscopic examination, a mixed vaccine corresponding to the various organisms present may be given with advantage.

Naturally the colon bacillus is often found in these cases, and when it is present there is a foul odor to the discharge. Staphylococci are also often found and some of these are quite virulent

causing much local disturbance. For this reason it is good practice to give a mixed vaccine containing streptococci and staphylococci in cases where the character of the discharges indicate that there are no colon bacilli present, and where colon bacilli are found, or where their presence is suspected, give a combination of streptococcus and colon bacillus.

In this connection it may be well to consider for a few minutes the question of giving mixed vaccines and what effect such vaccines may have if no infection exists corresponding to all the organisms presented in the vaccines. In this regard it should be realized that the dose of vaccine given for therapeutic purposes is small and will make no noticeable impression even if given in health. No one can realize how harmless a dose of vaccine is, until he has tried it on himself.



[illegible][illegible]

to separate the various kinds of germs, must be made and again incubated eighteen hours, then the vaccine must be made including the count of the organisms, and the sterilizing process. After this sterility tests should be made by incubation at least twenty-four hours before the vaccine should be used.

Imagine an average practitioner first hunting around for a culture tube, especially in a small town, then sending it to some place where bacteriological laboratory work is done and waiting until the autogenous vaccine is returned, for a case of puerperal sepsis, infected wound, erysipelas, pneumonia or any other acute infectious disease. Meantime the infection will have progressed in most instances to a point where the vaccine will no longer be of avail, no matter how well made or whether autogenous or not.

Such foolish delay is not advocated even by those who urge the use of autogenous vaccines under favorable circumstances where facilities for making them are close at hand. All advocate the use of stock vaccines in such cases to check the progress of the infection while the autogenous vaccine is being prepared. If a stock vaccine suffices to check the progress of an acute infection, why not continue using it? How are we to know when the patient is improving from the dose of stock vaccine, that the autogenous vaccine will do better?

Extensive clinical observation by many ob-

CHAPTER VII.

Autogenous or Stock Vaccines?

THE QUESTION of autogenous versus stock vaccines deserves careful consideration. An autogenous vaccine is one in which the organism used in making the vaccine is taken from the patient to be treated. This same vaccine would be a stock vaccine for any other patient having the same kind of an infection.

It must be admitted that the use of an autogenous vaccine is scientifically correct since it gives us a vaccine of the exact organism causing the infection, but in practical application it is not an easy matter to procure it, its preparation often being surrounded with many difficulties. Many infections are of such a nature that it is practically impossible to procure the organism for the production of an autogenous vaccine, and in acute infections where the organism can be procured the necessary delay in making the autogenous vaccine before treatment is started, is often of decided disadvantage.

To make an autogenous vaccine the culture must be procured and incubated eighteen hours to obtain a growth. Very often it will be found that the growth shows several kinds of organisms, there being a mixed infection present. Then subcultures,

to separate the various kinds of germs, must be made and again incubated eighteen hours, then the vaccine must be made including the count of the organisms, and the sterilizing process. After this sterility tests should be made by incubation at least twenty-four hours before the vaccine should be used.

Imagine an average practitioner first hunting around for a culture tube, especially in a small town, then sending it to some place where bacteriological laboratory work is done and waiting until the autogenous vaccine is returned, for a case of puerperal sepsis, infected wound, erysipelas, pneumonia or any other acute infectious disease. Meantime the infection will have progressed in most instances to a point where the vaccine will no longer be of avail, no matter how well made or whether autogenous or not.

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Extensive clinical observation by many ob-

servers shows that in staphylococcus infections properly prepared stock vaccines are just as efficient as autogenous.

Gilchrist (**Congress of American Physicians and Surgeons**, Vol. VIII, 1910, p. 164) on the use of staphylococcus vaccine in skin infections says: "Autogenous vaccines were made at first, but later it was found that stock vaccines acted just as well, so the former were not often used." Martin F. Engman (**Congress of American Physicians and Surgeons**, Vol. VIII, p. 191) in reference to the use of staphylococcus vaccine says: "Stock suspensions we have found very reliable and can be used in most instances . . . Autogenous suspensions are indicated where 'stocks' fail."

It is now quite generally admitted that in gonorrheal infections, stock vaccines answer every purpose.

In typhoid infections experience shows that carefully selected old cultures make a better vaccine for treating typhoid fever than autogenous vaccines.

The successful treatment of streptococcic infections is very important because of the danger involved, especially in puerperal fever, infected wounds and erysipelas. Here experience shows that the early use of streptococcus vaccine is of the greatest importance. This necessarily implies the use of stock vaccines to obtain the best results, because it takes too long to prepare autogenous vaccines to obtain the advantage of early treatment.

The same condition presents itself in treating pneumonia where stock vaccines are of unquestionable value when used early, the earlier the better.

Dr. Wm. A. Repp, one of the staff surgeons in St. Mary's Hospital, Detroit, informs me that he treated ten successive cases of puerperal sepsis, using a mixed streptococcus and staphylococcus stock vaccine, with uniformly good results.

Professor John O. Polak (*Journal A. M. A.*, Nov. 22, 1911, p. 1739) in part says: "Autogenous vaccines of a single strain have given me unreliable reactions. This, I think, can be explained by the fact that the coccus is attenuated in its strength and, after it has produced its first reaction, the leukocytes become more or less accustomed to the particular variety of coccus, and are less liable to effect a defense than when a vaccine of polyvalent strain is introduced.

"Mixed vaccines of reliable laboratories have given better results than when a single variety was used. This has been shown repeatedly in the blood-picture when an autogenous vaccine of single strain used in large doses, even up to 500,000,000, has failed to increase the leukocyte count or diminish the polynuclear percentage, the mixed vaccines of several strains have promptly produced a marked leukocytosis. Even colon bacillus infections, such as the infection of a pelvic hematocoele by the colon bacillus, have yielded more promptly to mixed vaccines of polyvalent strains, than when a single autogenous germ has been used.

"One characteristic which has been noted throughout all of our experience is that, even before any definite effect has been noted on the temperature, the well-being of the patient has seemed to be improved by vaccine injection."

Dr. J. M. Van Cott (*New York State Journal of Medicine*, July, 1911, p. 320) after giving tabulated results of 74 cases treated with a mixed streptococcus, staphylococcus, and colon bacillus vaccine says: "Analysis of the table results in the following conclusions:

"First:—Proper use of the polyvalent vaccine described above is not only harmless, but it is also of positive value in many cases of infection.

"Second:—A stock vaccine containing virulent strains has the advantage over the autogenous vaccines of saving valuable time, and being available at any moment for physicians who lack the facilities for procuring autogenous vaccines.

"Third:—Vaccination is useless, if the patient be already swamped with toxine. The only hope in such cases is to eliminate the toxine by catharsis, and the Murphy drip, or, where the infecting organism is known, by the use of an anti-serum in conjunction with the vaccine.

"Fourth:—Early vaccination offers the best prospect of success."

I have extensively used autogenous as well as stock vaccines and feel confident that future experience will fully justify my opinion that in acute infections stock vaccines, when given early, will

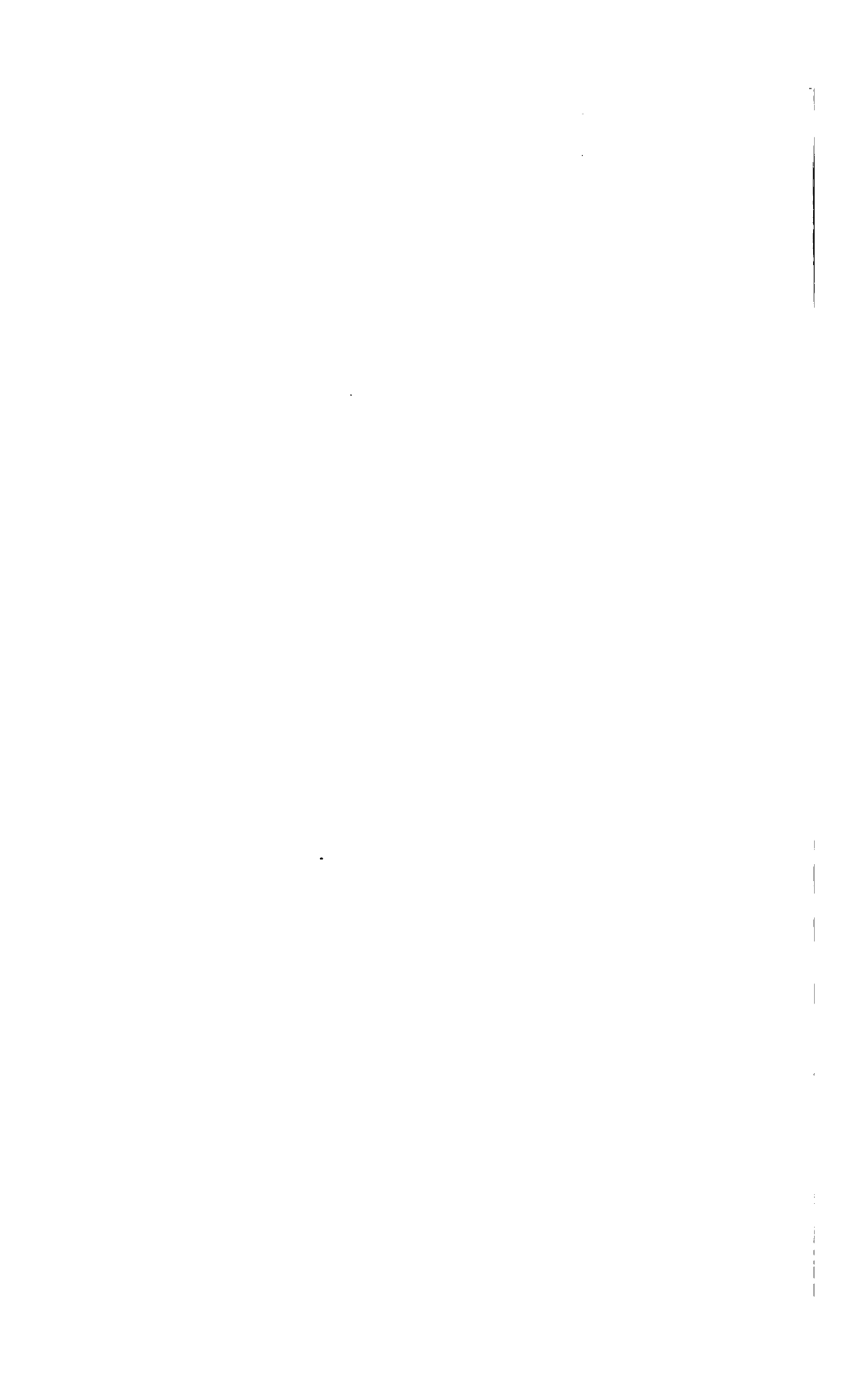
give as good if not better results than autogenous vaccines.

Autogenous vaccines should be used in subacute and chronic infections where stock vaccines have failed to give the desired results, and also in cases where bacterial examination shows that an unusual organism is present.

The essential feature in making good stock vaccines is to carefully select the cultures, make them up while fresh and sterilize them just sufficiently to just kill the organism.

If a mixed vaccine should be given having streptococci, staphylococci and pneumococci where only a pneumococcus infection should exist, the streptococcus and staphylococcus will have no effect save to raise the immunizing powers against these organisms. This is an actual advantage as it serves to fortify the individual against a later possible infection by these ever-present micro-organisms.





PART TWO

THE PRACTICAL APPLICATION OF VACCINE THERAPY

CHAPTER VIII.

The Treatment of General Infections.

WHILE THE USE of bacterial vaccines originated in attempts to treat localized infections and the first phase of vaccine therapy to gain credence among the profession was the use of staphylococcus suspensions in the treatment of boils, furunculosis, acne and other local skin infections, the advance of this method has been so uniform and rapid, that the progressive element among the profession is now successfully treating acute generalized infections in this manner.

The feasibility of using bacterial vaccines in cases of general infection involving the blood current deserves serious consideration. In making blood cultures by spreading a few drops of blood obtained from a vein with a sterile syringe, over agar slants from such cases often the number of colonies developed during incubation would indicate that the system is literally bathed with germs. To inject bacterial vaccines in such cases would look like adding toxic material to a system already overtaxed with toxemia and certainly does not appear plausible, but experience is a good teacher. The unquestionably good results obtained in general staphylococcus infections, pneu

monia, typhoid fever and the early stages of general streptococcus infections, is quite conclusive evidence that vaccines when injected under the skin have a special immunizing influence during the course of an active infection.

A series of experiments conducted by Hektoen (**Journal of Infectious Diseases** VII, p. 319) on animals shows that antibacterial substances are not found in the blood but in the tissues. In this connection we should also consider that as a consequence of an existing infection the tissue cells in all probability are to a certain extent prepared to produce immunizing substances when met with the stimulating influence of the vaccine. Professor James Callison (**Medical Record**, June 24, 1911, p. 1137) in attempting to explain this special immunizing influence of a vaccine in general infections suggests that, by inoculations of dead organisms these bacterial products are brought in great concentration into contact with those connective tissue substances which seem to be most active in the production of antibodies, and that the tissue-cell energy under the stimulus of these dead germs is suspended in the production of antibodies while in the progressive infection much of the cell energy is used up in combating the living organism.

Dr. R. E. English (**Journal of the Medical Society of New Jersey**, Dec. 1911, p. 363) says, "When bacterial vaccines were first proposed in the treatment of such diseases as septicemia, pneu-

monia, typhoid and the like, the proposition was met with the logical criticism that the fundamental principles of vaccine therapy would exclude such cases, for here were conditions in which the body was overburdened with circulating toxins. The stimuli to the mechanism of immunity were already excessive, so why add more toxic material? Would you not make conditions actually worse? Wright himself for a long time stood out against the practice, but so insistent were the conclusive evidences brought forth by many pioneers of the manifest benefit some cases of this class derived from vaccine therapy that Wright was compelled to expand his theory so as to include this type of disease."

There are numerous other instances recorded in medical literature showing the beneficial results of vaccine therapy in general infections but the results as summed up by Deaver, Da Costa, and Pfeiffer (Council of American Physicians and Surgeons, Vol. VII, 1910, p. 199) explains the situation as concisely as one could wish. They say, in part: "Specific vaccine treatment in our hands has not proved of benefit in the later stages of streptococcus septicemia.

"Staphylococcus septicemia has been treated with most favorable results at all stages.

"Septic intoxications without demonstrated blood invasions in a majority of the cases displayed general and local improvement under the use of

vaccines if given early; the later the treatment the less certain and less satisfactory the result."

When the non-toxic action of vaccines is once thoroughly understood as demonstrated by actual experience, the erroneous ideas of those who consider that vaccines are dangerous in acute general infections, will no longer find a place in medical literature.

It was the half-digested ideas published about the dangers of diphtheria antitoxin that retarded the general application of this most useful remedy for a long time, and it is to be regretted that this early impression still lingers, especially among the laity, and as a result the anti-toxin treatment is often delayed until it is too late to do any good.



CHAPTER IX.

Vaccines in Acute Infectious Diseases.

ON ACCOUNT of the fact that the nontoxic effect of physiological doses of bacterial vaccines is not fully recognized, the use of these vaccines in acute diseases has been overlooked. Those who are contending that the immunizing mechanism is stimulated by the toxic materials absorbed from the infected area naturally are reluctant to give vaccines in these cases, fearing that harm might be done by imposing still more toxic material on the body, by the addition of the vaccine, but theory is only valuable when corroborated by practice. Even such a conservative man as Professor J. G. Adami who contends that the toxic materials stimulate the immunizing mechanism says: "The good results obtained in these cases can no longer be questioned, and what is interesting is that the system evidently benefits from the slight temporary added rise of temperature which shows itself during the six hours or so immediately following the vaccination . . . Time forbids me to do more than note the curious paradox that often such vaccination converts a disease like typhoid fever, that ordinarily recovers by lysis, into a recovery by crisis, and vice versa

time and again changes a disease like pneumonia culminating in crisis into one healing by relatively slow, but favorable lysis."

SCARLET FEVER.

The bacteriology of scarlet fever has been very extensively studied for many years but only within the past year has anything of a definite nature been published regarding the bacterial factor in this common disease.

Dr. A. E. Vipond of Montreal (*Merck's Archives*, Sept., 1911, p. 278) recently announced the discovery of a bacillus which he isolated from the lymphatic glands of cases of scarlet fever and believes it to be the specific organism causing the disease. From the careful experimental research which was made he concludes:

(1.) The bacillus has been obtained from the seven cases of scarlet fever mentioned.

(2.) The bacillus will grow on all ordinary media, the growth occurring in three and a half hours. A most rapidly growing bacillus.

(3.) The bacilli are to be found in the lymph nodes, where they multiply and form toxins which enter the circulation.

(4.) The bacilli have been inoculated into five monkeys and two rabbits. Typical scarlet fever has developed in all, including the rash, enlarged lymph nodes and desquamation, etc. No suppuration in any instance took place at the point of in-

oculation. Streptococci would likely have had this effect.

(5.) The same bacilli have been recovered from the lymph nodes in each instance, and further, the typical growth has developed on the different media.

It has been recognized for some time that the streptococcus is a complicating infecting organism in many cases of scarlet fever especially where there is much throat complication. In a paper on the bacteriology of scarlet fever: (*Journal A. M. A.* May 29, 1910, p. 1803 review *Wiener Klinische Wochenschrift*, April 15, 1910) "Schleissner found streptococci almost in pure cultures on the tonsils in every case of scarlet fever examined in its incipency before the sore throat had developed. He was also able to cultivate streptococci from the blood in a large proportion of the seventy-three cases reported, and the presence of antibodies was also unmistakable, reaching the maximum about the tenth day. It seems evident that streptococci are closely connected with the scarlet fever process, and hence that antistreptococcic treatment can not fail to aid in attenuating the disease."

My own personal experience is limited to eighteen cases. Three of these were very bad cases with extensive throat complications in the early development. The promptness with which they recovered indicated unmistakable evidence of the value of the vaccine treatment. One case was complicated with nasal diphtheria. In this case I used

streptococcus vaccine in conjunction with liberal doses of antidiphtheritic serum but after apparent improvement for several days the patient finally died on the tenth day. All the other cases recovered without any of the unpleasant results that so often follow this disease.

Others using streptococcus vaccine in scarlet fever have been obtaining similar encouraging results. From what information I have been able to collect it seems to me that every case of scarlet fever should have a dose of streptococcus vaccine as soon as a diagnosis can be made. Such a procedure unquestionably modifies the course of the disease and there is freedom from streptococcus complications. In adults the average adult dose of 30,000,000 killed germs is given and in children from a quarter to a half of this amount according to age.

Usually in twenty-four hours there is a marked improvement with reduction of temperature. If the improvement continues no more vaccine is necessary. If the temperature rises again two or three days after the first inoculation the dose should be repeated. If no improvement is observed twenty-four hours after the first inoculation the dose should then be repeated. In very bad cases it is advisable to make daily inoculations until marked improvement is observed.

Just as the use of typhoid vaccine (q. v.) as a prophylactor has given such satisfactory results, so the use of streptococcus vaccine is useful in the

prophylaxis of scarlatina. Since no harm can result from a prophylactic injection of vaccine every child and adult exposed to scarlet fever should preferably be inoculated at the earliest possible moment. There is no reaction, no inconvenience and no trouble whatever.

I have used a streptococcus vaccine as a prophylactor in eight children exposed during the entire course of the disease of another member of the family. Of these two contracted the disease in a very mild form.

Dr. Ernest E. Irons (*Journal A. M. A.*, Nov. 12, 1910, p. 1718) in speaking of vaccines as prophylactors says: "The prophylactic use of streptococcus vaccine in scarlet fever is receiving much attention, particularly by Russian physicians, whose statistics appear to show a remarkable immunity to the disease in those who have received the protective vaccines." As a prophylactor the usual adult dose of streptococcus vaccine is given regardless of age and repeated in about eight or ten days.

ERYSIPELAS.

No one now doubts that erysipelas is caused by a streptococcus. Whether it is the streptococcus pyogenes or a special strain, the streptococcus erysipelatis, is still open to discussion. This disease is readily recognized from the clinical manifestations, bacterial verifications being quite unnecessary.

The organism causing the disease is not

readily procured as might be expected and it is often necessary to make many cultures before it is procured. The best way to obtain a culture is to cleanse the skin with alcohol, make a small cut through the skin and press out some blood serum from the subcutaneous connective tissue. Inoculations should be made on Loeffler's blood serum and incubated about eighteen hours. Almost invariably staphylococci will be found in abundance with but few colonies of streptococci. Subcultures should then be made by picking up a separate colony, to procure a pure culture of streptococci. This is frequently very difficult because the staphylococcus has a tendency to overgrow the streptococcus. If an abscess should form in the subcutaneous connective tissue the streptococcus is usually found in pure culture in the pus. I have never found streptococci in the blebs so frequently found in this condition, but staphylococci are present in abundance as the inflamed condition of the skin favors their development.

I have used streptococcus pyogenes vaccines in erysipelas with undoubted beneficial results, but a vaccine made from streptococci obtained from several cases of erysipelas gives better and more uniform results. Staphylococci which are normally present on the skin, become active because of the lowered local and general resistance and consequently are a complicating factor in the disease. For this reason staphylococcus vaccine should also be used. In erysipelas 20,000,000 streptococcus ery-

sipelas combined with 100,000,000 staphylococci and proportionally smaller amounts for children, seems to be a good average dose. If given early, material improvement is usually observed within one or two days. If no improvement is apparent in twenty-four hours, another dose should then be given. If there is a decided drop in the temperature, with the pulse and other conditions improving, it is well to withhold the next dose until the second day. In cases where the temperature does not rise again after it has once gone down, the dose should be repeated three or four days after the first inoculation.

Erysipelas is one of those toxic infections in which the immunizing impression of materials absorbed from the infected area is slow to develop and meantime the toxic materials frequently predominate. It is for this reason that the vaccine should be given at the very earliest possible moment. To use autogenous vaccines would require too much delay before treatment could be started.

If the case has advanced to extreme intoxication uniformly good results could not be expected, but even in these cases spectacular and prompt recoveries have come to my notice after using the vaccine.

OTITIS.

Acute otitis media is not only a very painful disorder, but often leads to deafness and not infrequently the infection extends into the mastoid

cells, resulting in the more serious mastoiditis. The importance of bringing this infective process rapidly under control with the vaccine treatment can readily be appreciated. The important pathogenic organisms usually found in acute otitis media are streptococci, pneumococci, staphylococci, or a combination of two or more of these organisms. This would naturally be expected because this trouble usually follows an acute infective process of the nasal cavity and pharynx due to invasion by the same organisms. Treatment should be started when the characteristic pain in the ear is present. If the vaccine is given early, often the ear drum may be saved. If there is much bulging of the drum it should be lanced. (Having taken a post-graduate course at the Chicago Polyclinic in diseases of the eye and ear and attended clinics daily at the Illinois State Eye and Ear Infirmary during the summer of 1892 with the intention of making these diseases a specialty, I have had some experience in treating middle ear infections before and after the advent of vaccines.)

Where there is considerable fever and pain, material improvement will be found in from twenty-four to thirty-six hours after the first inoculation. The relief from pain in these cases is often very marked within eight to twelve hours.

If there is no marked improvement by this time another dose should be given. Where the ear drum is punctured it will be found that the discharge will dry up in much less time if a vaccine is used.

Dr. Virginius Dabney (**New York Medical Journal**, Feb. 10, 1912, p. 273) from the reports of other authors and his own work shows that the use of vaccines was instrumental in curing three times as many cases of otitis media in the space of thirty days as was experienced without their use in the same class of cases.

Ordinarily inoculations are made from three to five days apart. A combination of streptococci, pneumococci and staphylococci is best given in these cases.

In some cases of middle ear infections the colon bacillus and other organisms are found. In such cases corresponding vaccines should be used. In chronic suppurating ears the streptococcus and staphylococcus are most frequently found, although rarely we may find the bacillus pyocyaneus and the colon bacillus. In treating these cases a combination of streptococcus, pneumococcus and staphylococcus should be used, injections being given from four to seven days apart and the usual local treatment used at the same time to take care of the saprophytes and other organisms that may be present.

In cases where the mastoid cells have become involved, most especially among the more ignorant who have neglected matters considering it only an "ear ache," the vaccine treatment often proves efficacious. The same vaccine that is used in the treatment of otitis media will be followed by good results. From the experience I have had I feel

confident that where the vaccine treatment is used early in these cases mastoid operations will be rarely called for.

It may be well to add here that the use of vaccines where a mastoid operation is inevitable is just as rational as their use under any other circumstances. The resistance is not increased by opening up the infected cells and the need for a specific immunity to the bacterial invasion is just as great. In such cases this adjunct treatment makes granulation and healing much more prompt and satisfactory.

WHOOPING COUGH.

It is now quite generally recognized that the bacillus first described by Bordet, occurring in cases of whooping cough, is the real organism causing this disease. It is a small, ovoid bacillus, regular in size and resembles somewhat the influenza bacillus. It may be procured in considerable numbers from the mucous coughed up during a paroxysm in the early stage of the disease. The bacillus is best grown on a special media prepared by Bordet, consisting of glycerine agar mixed with potato and equal volumes of rabbit or human blood.

Allen says that the organism is often found associated with the influenza bacillus; and when grown on this special media may be differentiated from the influenza bacillus; colonies of the latter bacillus causing hemolysis of the blood in the agar while Bordet's bacillus does not produce

hemolysis. The organism is gram-negative and stains readily with methylene blue.

Agglutination tests made by Bordet and other observers show that the blood of patients having the disease agglutinate the organisms even when greatly diluted.

Considerable work has been done with vaccines in this disease and the results so far obtained indicate that unquestionable benefit is derived from their use. This is particularly encouraging because the remedies usually employed in whooping-cough are of so little value, and with infants the disease is quite dangerous, because in so many cases it predisposes to broncho-pneumonia and other ailments. Freeman has used this vaccine extensively giving 25,000,000 dead organisms to a dose and finds that the length and severity of the disease is reduced to about one-half the usual course. Allen (*Vaccine Therapy*, page 266) thinks he has obtained better results by giving 50,000,000 or 100,000,000 to a dose.

Dr. Edwin E. Graham (*American Journal of Diseases of Children*, Jan. 1912, page 41) reports 24 cases treated in private practice with whooping-cough bacillus vaccine. In his first cases doses of 20,000,000 bacilli were employed with no untoward effects. The dose was increased to 40,000,000. From all indications the vaccine seems to be non-toxic. His results were certainly encouraging because the benefit of the vaccine treatment was not

only observed by the doctor but by the nurses, and other members of the family as well.

It occurs to me that in pertussis vaccine we should have a valuable remedy as a prophylactor in families where one child has contracted the disease and where children have been exposed. Much has yet to be done in this connection to demonstrate the possibilities of vaccine prophylaxis.

In this disease acquired immunity usually lasts through life and if similar lasting responses can be procured by vaccination, which appears entirely probable from results obtained from typhoid, cholera and meningitis vaccination, the benefits of this vaccine will become a veritable blessing.

The most recent information on this subject is a very interesting communication entitled "Pertussis Vaccine as a Curative and Prophylactic Agent," by Drs. Saunders, Johnson, White and Zahorsky, which was read before the St. Louis Pediatric Society and published in the March, 1912, issue of **Pediatrics**. These gentlemen have used a vaccine prepared from Bordet's bacillus in 40 cases of whooping cough, some in private practice, and a number at the Episcopal Orphanage and Bethesda Hospital during a recent epidemic.

They have observed no ill effects from its use and obtained benefit in all cases in which the cough was not of more than two or three weeks' duration, and in some of longer standing. The im-

provement in number and severity of paroxysms was often evident in less than 24 hours showing no evidence of a negative phase.

The conclusions drawn from the experiences of these gentlemen are as follows:

1. As a prophylactic agent we have no hesitation in recommending the pertussis vaccine. Whilst it is true that any infection will postpone or interrupt the course of pertussis, this agent alone will absolutely prevent it. The immunity is of uncertain duration, but the injections may be repeated, and it is of the utmost importance to postpone the disease until the first two years of life are passed. The failures reported by other observers must be attributed to an impotent vaccine, or an insufficient dosage.

2. As a remedial agent, success depends upon the promptness of administration, and the freedom of the patient from complications at the time.

3. In no case should other treatment be withheld if indicated, especially in infants, who may be spared convulsions or bronchopneumonia by the use of emetics, sedatives and some member of the aromatic group. It is quite possible that much better results may be obtained in late cases by the use of larger doses.

4. In view of the high mortality from pertussis in young children, there should be a systematic effort made to determine the duration of artificial immunity, and to keep them protected.

CHAPTER X.

"Colds" and the Common Respiratory Diseases

AMONG THE MOST COMMON AILMENTS met with in general practice, those due to or associated with the infective processes of the upper respiratory tract respond with much encouragement to vaccine therapy.

Rhinitis, pharyngitis, tonsillitis or "colds" are so commonly met with that almost all of us are expected to be bothered with them part of the time.

These so-called "colds" are now generally recognized as infections of the upper respiratory tract, pneumococci, streptococci, the micrococcus catarrhalis, Friedlander bacilli, influenza bacilli, and other organisms being found. Usually there is a mixed infection of two or more of these. Of these the most common and persistently pathogenic are the pneumococcus and streptococcus. The micrococcus catarrhalis and the staphylococcus are frequently met with in sub-acute and chronic cases while the Friedlander bacillus and influenza bacillus are not so often found. Some individuals suffer from these colds frequently and severely while others are more fortunate and have mild attacks at longer intervals. The reason so many people have repeated attacks is because the system

is not sufficiently impressed by the invading organisms during an attack to make the immunity lasting. In this class of cases we have essentially a surface infection and unless a systemic immunity is well established the germs will continue to linger on the surface of the mucous membrane, ready to become active just as soon as favorable conditions develop. Here it is that vaccine therapy comes to the rescue. By this means the immunizing faculty may be stimulated sufficiently to eradicate the invading organism and establish a cure. On the importance of the vaccine treatment in colds I will quote at length from Allen.

Writing on this subject (Vaccine Therapy, Third Edition, p. 169) he says: "Pneumococcal infections of the respiratory tract assume so many forms, and are so especially dangerous, that I make no apology for emphasizing the following points. In acute attacks the infection usually begins in the larynx or upper part of the trachea, but may begin in the naso-pharynx; the cough is paroxysmal and very distressing, and results in a tiny blob of a very tenacious colorless mucus. The infection spreads simultaneously upwards and downwards, the mucus becomes much more copious, yellow, purulent, and less tenacious, but the distressing cough continues. Pulse and temperature may be little affected. The infection may stop at the bifurcation of the trachea, or it may spread into the bronchi and bronchioles and produce an acute bronchial catarrh. Herein lies the chief danger

after a longer or shorter interval the patient may recover completely without vaccine treatment; but if the bronchial secretion be examined pneumococci will probably be found in abundance. Here they may lurk for weeks or months until climatic conditions or careless exposure to damp or draughts determines the lighting up of the dormant infection. The result of this may be bronchitis of the larger tubes, capillary bronchitis, pneumonia or pleurisy. I have seen each of these sequelae in those treated upon conventional lines, and if I can help it, never allow a sufferer from pneumococcal cold to dispense with vaccine treatment, this being continued if possible until careful examinations of the sputum no longer show the presence of the pneumococci. Such completely satisfactory results are hereby obtained that neglect of a medical man to urge the necessity of vaccine treatment in a case of pneumococcal cold, especially in an aged subject, is little short of criminal."

He advises that treatment be started with a polyvalent stock vaccine "at any stage of the attack—the earlier the better" to be followed up by an autogenous vaccine and concludes the advantages of treating an acute attack of catarrh upon these lines as follows:

"1. Convalescence is speedier — sometimes almost complete in twenty-four to thirty-six hours.

2. The stage of thick mucous secretion is

either practically eliminated or rendered much shorter and less distressing.

3. The use of expectorant drugs, which so often upset the digestion, may frequently be dispensed with.

4. The risk of complications is very considerably lessened. Indeed, I venture to say that, if this treatment were universally adopted, we should almost cease to hear of deaths due to pneumonia following upon so-called influenza, which in most cases is a pneumococcal cold pure and simple, Heart failure, arthritis, neuritis and the other complications would be equally rare."

Dr. H. M. Starkey (**Medical Brief**, June, 1911, p. 332) reports some experiences which aptly illustrate the advantages of vaccine therapy in these cases:

"Case 1. Mrs. C. P. Within a year previous to last June had ten severe colds in the head. She came to me June 15th, with a fresh cold well under way. She was given mixed streptococcus pyogenes thirty million and micrococcus catarrhalis one hundred million, and told that she would probably require another injection in five days. She was receiving treatment for catarrh. The cold was gone in thirty-six hours, and there has been no recurrence and she has had no subsequent injection and no treatment of any kind for nearly three months.

"Case 2. E. P., age thirteen, son of the lady just mentioned, has had something like hay fever each summer for several years past. The trouble

comes on in June with coryza and bronchitis, and a cough and nervousness that prevent eating and sleeping, so that by fall the lad has been a physical wreck. The symptoms had been showing their usual severity for three or four weeks, when he came to me about the middle of July. I gave him vigorous local treatment and three-fourths of a dose of streptococcic vaccine, and repeated it in one week. The symptoms were rapidly improved and disappeared within two weeks. He has come through the summer in good condition. Twice he has had some cold and has received injections and the cold has disappeared.

"Case 3. Mrs. S., has been apt to get a cold each fall that appeared as a sore throat, then next day as a cold in the head, quickly involving the bronchi and causing a cough lasting from one to two months. The usual cold occurred this fall about October 1st, and the sore throat of one day had passed into the coryza of the next, when to local treatment was added a dose of mixed streptococcus and micrococcus catarrhalis. In thirty-six hours the cold had disappeared without bronchitis, and without cough and there has been no recurrence.

"Case 4. Mrs. W., under treatment for chronic catarrh with middle ear disease and subject to severe attacks of cold in the head, usually lasting several weeks and increasing the ear trouble, came with one of her severe colds of two days' duration October 16th. She had a rather severe

sore throat, and the nose was stopped, but the nose and eyes were flowing freely and she was altogether miserable. I gave her beside appropriate local treatment an injection of thirty million of streptococcus pyogenes and one hundred million of micrococcus catarrhalis. She went from my office, without my knowledge, to a large unheated room, where she remained giving instructions for an hour or more. She went to bed soon after and was taken with high fever and severe sore throat so that she thought she had caught more cold, and was in for a siege. The symptoms became so severe that before midnight she had to send for a doctor. The symptoms rapidly subsided and by morning she was so much better that she went out for her usual duties, which are very arduous. In a few days the cold had entirely disappeared, much more quickly she says than she had ever had one go before, and without bad effects to the hearing or otherwise."

Dr. B. W. Rahney (*Journal Indiana State Medical Association*, July 15, 1911, p. 303) in referring to the use of vaccines for colds says: "Another promising field for vaccine treatment is in acute colds, results in some instances being most surprising, the colds disappearing in twenty-four hours."

During the past three years I have used stock vaccines extensively as a routine in treating acute colds, usually depending upon clinical symptoms to make a diagnosis for the first inoculation. Formerly the diagnosis was verified by bacterial examination both from slides and culture growth!

but pneumococci and streptococci and more often both organisms were, for all practical purposes, such constant factors that during the past year bacterial examinations to verify the diagnosis were not frequently followed up, but mixed stock vaccines were used empirically. My experience led me to believe that in acute colds, if the case is immunized against the pneumococcus and the streptococcus, infections caused by the other organisms often found in these cases are of secondary importance. It is quite probable that the Friedlander bacillus, influenza bacillus and other organisms start an inflammatory process and thus pave the way for a subsequent more serious pneumococcus or streptococcus infection. The micrococcus catarrhalis is more constantly found in a class of cases where the catarrh takes on a sub-acute or chronic form during the interval between the acute attacks caused by pneumonia epidemics. Streptococci are more frequently found in the tonsils, larynx, trachea, and bronchi, but rarely in the nose. Pneumococci and the micrococcus catarrhalis are found in the entire respiratory tract. Staphylococci are more frequently found in the nose, and bronchi probably as secondary invaders, after other organisms have prepared the way. These so-called cases of influenza or la grippe often coming in epidemic form, from my experience during the two past years are most frequently pneumococcus infections, the influenza bacillus not having been found once. My endeavor

has been to meet the conditions presented by these so called "colds" with stock vaccines to be applied empirically as indicated by clinical symptoms, so they may be applied as a routine in general practice, and I feel from the results so far obtained that this method is entirely practical.

In a general way from clinical symptoms we have two classes of cases suffering from colds, those having acute attacks that clear up during the intervals and those in which the condition has a tendency to linger on between the attacks. The former are more particularly due to the pneumococcus and streptococcus while the latter in addition are usually complicated with the micrococcus catarrhalis or mucosis group of organisms. In the treatment of these cases I used a mixed stock vaccine composed of the various strains of each organism for the former class of cases pneumococcus 40,000,000, streptococcus 30,000,000, and staphylococcus 200,000,000, and in the latter pneumococcus 40,000,000, streptococcus 30,000,000 and micrococcus catarrhalis 100,000,000.

Usually there is a marked improvement in from 12 to 24 hours after the first inoculation and often all the acute symptoms have subsided with the patient progressing nicely to recovery. On the second day another dose should be given or the case is liable to relapse, and after that, inoculations should be made at from three to six-day intervals until all symptoms of the disease have disappeared.¹ Those cases that are complicated with the mi

coccus catarrhalis usually require treatment for a longer time. In some cases it is necessary to double the dose. If prompt improvement should not take place with this routine method of treatment careful bacterial examinations should be made of the sputum by slides and the cultural methods to determine what additional organism may be the cause of the trouble.

This method has been so satisfactory in my hands that I have no hesitation in saying that if it were generally adopted practically all the severe complications following colds, pneumonia, arthritis, mastoiditis, endocarditis, and other ailments, would be eliminated, because in this way the patient becomes immunized against the pathogenic organisms causing the trouble early in the course of the disease while the system is still in a condition to respond readily to the immunizing influence of the vaccine. Furthermore, these colds are disagreeable afflictions even in cases where no serious complications follow and should be cured with the best means at our command. Here I can speak from personal experience having been afflicted with colds at about four-month intervals for years. Before using the vaccines it always required from three to six weeks for recovery to take place and now, with the vaccines, it requires about that many days, but I find that if the inoculations are not continued for a few weeks at from four to six day intervals the cold is liable to return. Other members of my family have had the

same experience and none of us would think of enduring the miseries of a cold without using the vaccine.

Any physician who has used these vaccines in colds will soon become a convert to this method, and especially if he uses them on himself during an attack. In this way he will not only appreciate their therapeutic value but he will also thoroughly realize their harmlessness.

A combination vaccine consisting of staphylococcus, pneumococcus and streptococcus is usually employed in these cases but where bacterial examination shows other organisms present corresponding vaccines should be used instead. Treatment is started with an average dose and gradually increased to twice this size. Inoculations are made from four to seven days apart and continued for several months.

Catarrhs are so liable to become chronic under conventional treatment that the early use of the vaccines becomes an important factor. When the vaccine method is employed in the acute stage these cases are cured before they become chronic. One characteristic feature of the vaccine treatment in sub-acute and chronic infections of the respiratory tract is the marked general improvement that is noticed before the local infection shows much change.

Chronic catarrh is one of the ailments that is altogether too frequently met with. It would be senseless to contend that vaccines would correct

deformities of the nasal cavity or that operative procedures should be dispensed with; but there is no denying the fact that we frequently meet with cases that are troubled with catarrh in which there is no material physical disturbance but the individual "catches cold" easily and from frequent attacks becomes a chronic sufferer. The same variety of germs are usually found in catarrh that are found associated with chronic bronchitis—streptococci, pneumococci, staphylococci, the micrococcus catarrhalis, the Friedlander bacillus, the bacillus ozena or various combinations of these organisms. The streptococcus is frequently found in the naso-pharynx but not so often in the nose, here the staphylococcus is most commonly present.

BRONCHITIS.

In sub-acute and chronic bronchitis, bacterial examinations of the sputum usually show the same organisms that are found in acute bronchitis and broncho-pneumonia — streptococci, pneumococci, staphylococci or a mixed infection of two or more of these organisms. The micrococcus catarrhalis or Friedlander bacillus is also found with one or more of the former organisms. Some cases of chronic bronchitis have been reported ascribed to the influenza bacillus. In our sputum examinations this organism has been conspicuously absent.

Asthma and bronchitis are often closely associated and in these asthmatic cases the same var-

iety of organisms is found that we meet with in bronchitis. E. W. Allen, (*Journal A. M. A.*, Oct. 9, 1909, review *Lancet*, Sept. 11, 1909), says: "Careful bacteriologic examinations in over twenty cases of asthma have failed to reveal the constant presence of any one particular organism; each case presents a complex picture, most swarm with microorganisms, and a few have shown within the casts and spirals nothing but short streptococci." Further, Allen feels that a variety of streptococci is of considerable importance in the production of some of the symptoms of certain cases of severe bronchial asthma.

My experience in treating sub-acute and chronic bronchitis with vaccines has been quite satisfactory. As a rule good results will be obtained with stock vaccines, marked benefit being observed after the second or third inoculation. In these cases the streptococcus seems to be the most constant pathogenic organism, with the pneumococcus next in importance. Staphylococci and the micrococcus catarrhalis are also frequently found but they are not so definitely pathogenic.

With this in mind it will be seen that the best average results are obtained with the streptococcus, pneumococcus, staphylococcus combination vaccine or streptococcus, pneumococcus, micrococcus catarrhalis combination. Where marked beneficial results are not observed after the second or third inoculation a bacterial examination of the sputum should be made. Where unusual organ-

isms exist, and in cases where stock vaccines do not give the desired results, autogenous vaccines should be made.

ASTHMA.

In all probability the condition known as "Asthma" is caused by these bronchial infections and the results which the vaccine treatment of these cases has secured, have been quite gratifying. In subacute and chronic cases inoculations should be made at intervals of from four to seven days. In some cases it is necessary to increase the dose to three or four times the average size to obtain the best results.

In chronic asthmatic cases where there is much emphysema it could hardly be expected to restore the extended air cells to a normal condition but even in many of these cases much can be accomplished with the vaccines. By immunizing the patient to the organisms causing the bronchial infection the amount of bronchial secretion is lessened and the bacterial irritation causing coughing and the spasmodic contractions of the bronchioles is materially diminished.



CHAPTER XI.

Pneumonia and the Allied Infections.

LOBAR PNEUMONIA even with the advanced methods of treatment of the present day is still one of our most fatal diseases. This in itself would seem to be conclusive evidence that the present methods of treating this disease are not efficient.

The pneumococcus is recognized as the pathogenic factor in this disease, although streptococci are also frequently found and in such cases no doubt are a complicating factor. Pneumococci of varying virulence are often found in the throats of healthy individuals, some being readily exalted while others take on virulent characters with difficulty and revert back. The respiratory tract is the portal of entry, pneumonia usually resulting from a pneumococcus "cold" in which the infection extends down into the bronchi and bronchioles. Dr. J. W. Eyre (*Lancet* Feb. 22, 1908, p. 451) says: "The pulmonary tissue constitutes the second line of defense. Once arrived at the lung alveoli the pneumococcus readily enters the blood capillaries and so reaches the general circulation."

The study of the immunizing process of pneumococcus infections has been quite extensive, and from the results so far obtained, it appears

that the production of opsonins is the most important factor. Rosenow, (*Journal of Infectious Diseases*, 1906, Vol. 111, p. 683) found a greater phagocytic power of the leukocytes in a case of pneumonia than that of normal leukocytes. Eyre (*Lancet*, Feb. 22, 1908, p. 546) in referring to Macdonald's work states that his investigations confirm the results obtained by Macdonald showing that the formation of pneumococcic opsonin throughout the course of the disease indicates the movements of the curve representing the opsonic index and affords an exact record of the measure of resistance opposed by the patient to the inroads of the organism. They find that in cases where the opsonic index rises abruptly recovery takes place by crisis, where it rises slowly recovery takes place by lysis and in fatal cases the opsonic index continues to go down. Eyre also shows a striking relation between the leukocyte count and the opsonic curve. In fatal cases leukocytosis is absent and the opsonic index falls gradually and constantly. In favorable cases the leukocyte count is high in the early acute stage and falls until before the crisis when it rises again with the index. From this it would appear that at least three factors are at work during the immunizing process in pneumonia; increased production of opsonins, a leukocytosis and an increased phagocytic power of the leukocytes. In treating pneumonia these factors should be taken advantage of. In most cases the production of leukocytes

as a consequence of the infective process is adequate but where no increase of leukocytes has taken place the prognosis is unfavorable.

John O. Polak (*Journal A. M. A.*, Nov. 25, 1911) reports a large series of cases of streptococcus and other infections in which he made leukocyte counts from four to six hours before and eight hours after each inoculation of bacterial vaccines to determine the influence of vaccine therapy on leukocyte production and its relation to the required size of the subsequent dose. He found that in most cases there is a marked increase in the number of leukocytes after vaccine inoculations and that this increase is more marked when a mixed vaccine of several organisms or a vaccine of several strains is used than where a single strain vaccine is employed.

There is no doubt that pneumococcus vaccine will increase the opsonic content of the blood. This has been abundantly demonstrated. Dr. R. W. Allen of London (*Vaccine Therapy*, Third Edition, p. 117) says:

“We are therefore limited, in our endeavors to find a truly scientific method of treating cases of pneumonia, to increasing the amount of opsonin; and this, as has been already shown, can be effected by injections of a vaccine, best of the patient’s own bacteria; the benefits thereby secured are so immediate and so great that the author has little diffidence in asserting that the

space of a few years will see all cases of pneumonia treated by this method.

"A weak, irregular, very rapid pulse, enfeebled constitution, low muttering delirium, dry furred tongue and sordes about the lips, are of course unfavorable signs; yet so marked has been the improvement, even after one injection, in two cases of this type, that no case is to be looked upon as hopeless."

Butler Harris, from a study of eleven cases of pneumococcic lung infections treated with vaccine, concludes—

1. That successful inoculation for pneumonia is possible.
2. That inoculation does no harm.
3. That a vaccine from one or a number of virulent strains should be used.
4. That it should be introduced as early as possible.
5. That indical control is unnecessary.
6. That temperature and physical signs are sufficient guide.

The advantages, then, to be claimed for routine treatment by vaccines in all cases of pneumonia are: Precipitation of the crisis; diminution, therefore, of the risks of heart failure and other toxemic symptoms; increased comfort of the patient, and diminished liability to each sequelae as empyema; curtailment of the whole course of the disease to a fortnight, or even less.

In chronic or unresolved pneumonia the exhi-

bition of a vaccine is the treatment par excellence. An initial dose of 25,000,000 may be increased subsequently to 50,000,000, control for dosage and intervals between the injections being furnished by—(1) auscultatory signs; (2) careful microscopy of the sputum for bacteria and varieties of cells present; (3) general condition of the patient.

On the value of pneumococcus vaccine Dr. W. H. Watters says: (**New England Medical Gazette**, Sept. 1910, p. 419) "Any conclusions that are drawn concerning the value of this form of treatment in pneumonia must be of questionable value unless they are based on the changes from severe illness to comparative comfort and convalescence. . . . It must be said, however, that such favorable alterations occur with pleasing frequency after suitable inoculations and that many of our clinicians believe that not a few apparently hopeless cases have been saved by this method of treatment."

Dr. F. E. Stewart holds (**Journal A. M. A.**, May 1910, p. 1824) "that the pathologic condition resulting from an acute pneumococcic infection can be relieved, removed or modified by injecting killed bacteria of the species causing the diseased condition."

Bacterial examinations in broncho-pneumonia show that most cases are mixed pneumococcus and streptococcus infections and for this reason I use pneumococcus and streptococcus combination vaccine as a routine in treating these cases.

The results were so uniformly good in all cases, even where streptococci were not found in the sputum that I was lead to use the same combination in treating lobar pneumonia and observed that better results were obtained than when only pneumococcus vaccine was used.

The value of streptococcus in conjunction with pneumococcus vaccine in treating pneumonia may be accounted for in various ways: It is known that the streptococcus often exists as a mixed infection in pneumonia and sometimes is the primary cause. It is also probable that in many severe cases the streptococcus is a complicating factor although the organism may not be found. An increased number of leukocytes being important as an immunizing factor the addition of a polyvalent streptococcus vaccine according to Polak's experience would aid in stimulating the production of leukocytes.

Furthermore it is not always an easy matter to distinguish the streptococcus from the pneumococcus, the two organisms having many characteristics in common, in reality streptococci and pneumococci are organisms of closely allied species. This is quite clearly indicated by experiments conducted by Rosenow about which he writes (*Journal of Infectious Diseases*, Sept. 1911, p. 192): "It was hoped that in the anaphylactic reaction we might find an additional test for differentiating pneumococci from streptococcus *typhimurium*, but the experiments show that strept-

ococcus extracts sensitize with respect to pneumococcus extracts and vice versa, while injection of streptococcus extracts rarely produce fatal shock, whether the animal is sensitized with either streptococcus or pneumococcus extracts."

During the past two years I have paid particular attention to the comparative value of pneumococcus and mixed pneumococcus and streptococcus vaccine in treating pneumonia not only in my own practice but also in cases treated by other physicians whom I have supplied with vaccines. From this experience, I am confident that the mixed vaccine is preferable. The most essential point in treating pneumonia with vaccine is to begin treatment early, for obvious reasons.

In eight successive cases of pneumonia where I gave the mixed vaccine during the first day of the disease, six had a normal temperature in from one to two days, and thereafter made an uninterrupted recovery, being able to be about within a few days after that. In one case a normal temperature was reached on the fourth day and in the other on the fifth day. These were all typical cases of pneumonia, starting with a chill followed by fever ranging from 102 to 104, rapid pulse, pain in the lung and coughing up bloody mucus. Inoculations were made at from one to two day intervals but none received less than two doses. Other physicians have had similar experiences with pneumococcus and streptococcus vaccine.

The combination that I have been recommend-

inging and also using in my practice is a regular stock preparation consisting of pneumococci 30,000,000 and streptococci 20,000,000. This vaccine is nontoxic and since the dose is comparatively small, it should be repeated at daily intervals until a normal temperature is reached and in the early stages of extremely bad cases may even be given at 12-hour intervals until some improvement is noticed. In cases where the vaccine is given less frequently than once a day it is best to repeat the dose when the temperature rises abruptly again after having been down. To avoid relapse it is always advisable to give a few doses at four or five-day intervals after the case has recovered.

The adult dose of pneumococcus vaccine advocated by different observers varies from 20,000,000 to 100,000,000. Those giving the small doses advise inoculations once or twice a day and those using the larger dose recommend daily or every second day inoculation.

BRONCHO PNEUMONIA.

The bacterial findings in broncho-pneumonia as found in repeated sputum examinations may show pneumococci, streptococci, staphylococci, influenza bacilli or other organisms to be present. It is not often that one of these organisms is found to the exclusion of the others. Usually there is a mixed infection with the pneumococcus, streptococcus and staphylococcus predominating. We find *cases of typical broncho-pneumonia at all seasons*

of the year, but there are times when the disease is much more prevalent, spreading in epidemics.

In some of these epidemics the pneumococcus predominates, in others the streptococcus is found more frequently and in times when influenza is rife, the influenza bacillus predominates. The staphylococcus is more constant, being found almost invariably. Sputum examinations in our laboratory showed a prevalence of streptococci in these cases during the winter of 1908-1909, whereas the pneumococci predominated during the winters of 1909-1910 and 1910-1911.

L. Emmet Holt reports very extensive bacterial research in bronchial troubles in children and nurses. The results of his work show that the pneumococcus, streptococcus and staphylococcus are the organisms most frequently found, and very often they are associated.

With such a variety of pathogenic organisms found in a disease condition it is, of course, impossible to know which one is the predominant or essential factor. Naturally the numerically prominent organisms would be considered the important factor, but this is not necessarily the case. The virulence of the infecting organism must also be considered. Thus we may have staphylococcus in abundance, and not so many streptococci. In such a case the streptococcus is the greater pathogenic factor because it is a much more virulent organism. The same may be said of pneumococcus. So in treating broncho-pneumonia with a stock vaccine

it is essential to use a vaccine which is directed against the most important pathogenic organisms usually found. By immunizing against these more virulent organisms, other organisms present will be the more readily disposed of.

The fact that the pneumococcus and streptococcus are the most important pathogenic factors in broncho-pneumonia explains why we have been obtaining such uniformly good results with streptococcus and pneumococcus mixed vaccine.

The average adult dose should be pneumococcus 30,000,000, streptococcus 20,000,000 repeated at daily intervals until a normal temperature is reached. Marked improvement is usually observed in 24 hours after the first inoculation. The dose is sufficiently large to stimulate the immunizing mechanism without producing a perceptible toxic or negative phase. After the extremely acute symptoms have subsided from the pneumo-streptococcus infection it is well to combine a staphylococcus with the vaccine to take care of the staphylococcus infections which become a more important factor in the later stage of the disease. It is also well at this time to slightly increase the dose of the other organisms making the combination pneumococcus 40,000,000, streptococcus 30,000,000, staphylococcus 150,000,000. Treatment should be continued at from three to five or six-day intervals until the patient has entirely recovered.

As broncho-pneumonia is a disease which is

particularly prevalent among infants and children, the mode of administering vaccine is of special advantage. A hypodermic injection insures one at least that the patient has the required dose and the mother and nurse are relieved of the unpleasant need of giving the baby medicine. The dose of the vaccine being small (from $\frac{1}{4}$ to $\frac{1}{2}$ a cubic centimeter) it often can be injected before the baby is aware of what has happened. Usually only two or three doses are required in these cases to effect a cure.

In acute bronchitis we have practically the same bacterial condition that is found in bronchopneumonia and the infection, being less virulent, can be controlled by inoculations made at longer intervals, preferably from four to six days apart.

PLEURISY AND LUNG ABSCESS.

The after effects of a pneumonia or other infective process of the lung are manifestly in the same category as pneumonia itself.

It is just as reasonable to expect to secure good results in a pleurisy following a pneumococcus-streptococcus lung infection as in the original infection itself. (It should be said in passing that complications such as pleurisy and pulmonary abscess are practically unknown following pneumonias that have been treated with vaccines.)

Chronic pleuritic adhesions with recurrent pleurisy may be very satisfactory treated with

suitable bacterial suspensions. The combination of microorganisms that should be selected is the same as that used in pneumonia—streptococcus and pneumococcus and, occasionally, streptococcus, staphylococcus and pneumococcus.

The treatment usually requires a longer time and more persistence just as experience will show it to be necessary in the treatment of other chronic infections. It must be borne in mind that other treatment, both local and general, is not contra-indicated when vaccines are used.

PLEURISY.

Pleurisy is one of those painful inflammatory processes in which a diagnosis can usually be made from the clinical symptoms. I have had frequent occasion to make bacterial examinations of pleuritic fluid following acute pleurisy, but in most cases have found the fluid sterile. From this it should not be inferred, however, that pleurisy is not of bacterial origin. The pneumococcus is the most constant organism in these cases. Where there is much pleuritic effusion it is always advisable to aspirate. If the vaccine treatment is started early the inflammatory process will be in many cases promptly aborted with a resulting relief from pain and the production of a very limited amount of pleuritic fluid. I have seen relief from pain follow 12 hours after an inoculation of vaccine. While the pneumococcus is the principal in-

fecting organism in these cases yet as a routine treatment, I think a pneumo-strepto staphylococcus combination vaccine answers the purpose better because of the possibility that staphylococci and streptococci may also be present.

EMPHYEMA.

When the pleuritic fluid becomes actively infected, we have an empyema requiring surgical procedure to evacuate the pleural cavity. The usual procedure is to resect a rib so as to give sufficient drainage until the pleural cavity has healed. With the use of vaccine it is not necessary to make a rib resection in cases where the diagnosis is made early. An incision between the ribs with two drainage tubes will suffice.

Bacterial examination in these cases shows the pneumococcus as the principal organism, streptococci, staphylococci, and colon bacilli are also found. After using vaccines in these cases the pus becomes very thin within a few days and then develops the appearance of serum. When the purulent character of the discharge has subsided and a serum has taken its place, the drainage tubes may be removed and the wound allowed to close. In one case of empyema following a severe attack of pleuro-pneumonia in a child 5 years old, I withdrew the tubes on the fifth day. The wound healed without any subsequent trouble.

Since the infection is often of a mixed charac-

ter, a combined vaccine of pneumococcus 40,000,000, streptococcus 30,000,000, staphylococcus aureus and albus each 100,000,000 is given to best advantage. Inoculations should be repeated at two or three-day intervals until the inflammatory process subsides.



CHAPTER XII.

Tubercle Infections.

IN CONSIDERING the use of bacterial vaccines in the treatment of tuberculosis it is essential for one to consider other factors besides infection by the tubercle bacillus because there is probably no case of tuberculosis that terminated fatally in which other pathogenic organisms were not important factors.

The clinical history of tuberculosis often dates from an attack of pneumonia, broncho-pneumonia, bronchitis or a "bad cold" and when we realize that these ailments are caused by the pus group of organisms, the streptococcus, pneumococcus and staphylococcus, and that these germs are usually found associated with the tubercle bacillus in advanced tuberculosis, the far-reaching results of the vaccine treatment as preventatives or prophylactors, as well as curative agents, can be better appreciated. In many cases where a dormant tuberculous infection of the lung exists, a broncho-pneumonia, a "bad cold," or a strepto-pneumococcus infection of the air passages, will make conditions favorable for the rapid development of the pre-existing tuberculous condition. If in these cases the broncho-pneumonia or cold is promptly taken care of with a combined

strepto-pneumo-staphylococcus vaccine, much will have been done to prevent the development of tuberculosis in such cases. On the other hand a retarded recovery of pneumonia, broncho-pneumonia or bronchitis leaves an excellent soil for the development of pulmonary tuberculosis. In such cases the use of vaccines will go a long way in the prevention of such a state of affairs for as a case of tuberculosis progresses the growth of these pathogenic organisms always accompanies the tubercle bacillus as found by repeated sputum examinations.

The most important complicating organisms are staphylococci, streptococci and pneumococci. The micrococcus catarrhalis, the Friedlander bacillus and other organisms are also often found. There is practically always a mixed infection of two or more organisms. On the influence of mixed infections in pulmonary tuberculosis Allen says: (Vaccine Therapy, Third Edition, 1910, p. 224) "It is to the comparative inattention paid to the mixed infection in pulmonary tuberculosis that the poor results obtained by specific treatment in the more advanced stages is to be attributed. How great the natural powers of resistance to the tubercle bacillus are can be gauged from the high percentage of the human race who become infected in infancy and youth, and yet recover spontaneously. Tuberculin therapy cannot possibly influence mixed infection, which, as Pottenger points out, exists in cases displaying fever of even mild

degree, and has doubtless an influence on the tuberculous process in many cases where no rise of temperature exists. Personally I should be inclined to go almost so far as to say, exclude secondary infection, and every case of pulmonary tuberculosis would recover if placed under suitable conditions. A simple experiment will show the importance of a mixed infection: Take a uniform emulsion of living human tubercle bacilli, and add equal volumes of emulsion—say 0.1 c. c. to 10 c. c. of glycerine broth in each of two culture tubes, A and B. Prepare a broth culture of staphylococcus albus from a case of pulmonary phthisis, and after twenty-four hours' incubation sterilize at 60° C. for one hour. Now to tube A of tubercle in glycerine broth add 2 c. c. of this sterile staphylococcic broth, and place the two tubes, A and B, to incubate at 37° C. At the end of a week little visible growth will have occurred in tube B, whilst profuse growth may be seen in tube A. The staphylococcus broth has acted as a manure to the tubercle bacilli, and promoted their multiplication. It would thus appear probable that mixed infection has a two-fold action. Not only does it lead to softening and disintegration of the lung tissue, but it may also increase the rapidity of growth of the tubercle bacilli."

The tubercle bacilli under ordinary conditions are slow growers and frequently connective tissue walls are thrown around them which effectually house them off, but the pus organisms break down

this connective tissue wall and set the tubercle bacilli free, thus allowing them to spread out and infect new areas. Furthermore much of the fever, night sweats, cough, excessive expectoration, etc., is due to the pus group of organisms and can be brought under control by vaccine treatment and in this way the patient is given a tremendous advantage in the fight which is a hard enough one, no matter how favorable the circumstances. In treating tuberculosis we have been so much concerned with freeing our patients from the tubercle bacillus and its toxic products that important side infections are often disregarded.

Another important element in successfully handling cases of pulmonary tuberculosis is to have the digestive functions in good condition. We all are aware how a febrile state will impair the appetite, interfere with digestion and cause a general feeling of lassitude and depression. There is a distinct difference in this regard with a fever caused by a coccus infection and one caused by the tubercle bacillus. When I find a patient running a low temperature without being aware that any fever exists I am always suspicious of tuberculosis, but if we find ever so slight a fever from a coccus infection the patient generally feels quite sick, complains of being feverish, with loss of appetite, and generally expects more fever than the thermometer shows. It is this element of fever, caused by the cocci in mixed infections in tuberculosis, that has the depressing effect in these cases. When

the toxic influence of the coccus infections is eliminated with appropriate vaccines, the appetite, digestion and other conditions will correspondingly improve and thus give the patient a better opportunity to overcome the tubercle infection. It has been pointed out before that these vaccines are non-toxic and consequently will do no harm.

The streptococcus, pneumococcus and staphylococcus being the most important complicating organisms, a mixed vaccine containing these organisms should be given until a bacterial examination, to determine what organisms are present, can be made. If no other pathogenic organisms are found, treatment with the stock vaccine should be continued making inoculations from three to five days apart starting with an average dose. Where other organisms are found corresponding vaccines should be given. It is advisable to start with an average adult dose and if there is slight or no local disturbance produced at the point of inoculation the dose may be increased. Careful bacterial examinations of the sputum should be made from time to time to determine the bacterial condition. Treatment should be continued through the entire course of the disease.

In treating tuberculosis, the question of using tubercle vaccine naturally arises. There is an endless variety of opinions among those having large experience in its use with regard to the value of tuberculins in pulmonary tuberculosis. The funda-

mental reason for this is, no doubt, due to the toxic influence of this remedy.

Unless the dose is very carefully gauged the patient is liable to get too much, resulting in a prolonged negative phase. The consensus of opinion seems to be that if either of the tuberculins T. R. or B. E. is used, very small doses should be employed in the start, from .0001 to .005 of a milligram and the patient carefully watched. The dose should not be repeated oftener than once in seven or ten days.

If it is desired to give tuberculin it may be given with the vaccines for the coccus infection, the two not interfering in the least. Open-air treatment and other recognized measures that are destined to increase the health of the patient will be greatly aided by the vaccines.

BONE TUBERCULOSIS.

In the cases of bone and joint tuberculosis where there are sinuses with discharging pus we usually have a mixed infection, the pus organisms are present with the tubercle bacilli. Often these pus organisms are so numerous that they entirely obscure the tubercle bacilli. Treating these with tuberculin or B. E. without giving bacterial vaccines for the other organisms, is of little avail. Bacterial examinations in these cases will show what vaccines are to be used. It is well to start with a small dose and work up as the case progresses, especially so if the complicating organisms happen to be the staphylococci.

CHAPTER XIII.

Vaccine In Acute Articular Rheumatism.

ACU TE ARTICULAR RHEUMATISM is now regarded by modern pathologists as an infectious disease. The bacterial research into this field was started by Wilson (**Edinburgh Medical Journal**, June, 1885), who found micrococci in the pericardial fluid of a case dying of rheumatism. Budzy (**Orvosi Hetilap**, 1890, Nos. 39-42) found streptococci in the joint fluid from the shoulder in a case of acute rheumatism.

Extensive research has been carried on since then by numerous investigators, prominent among them being Poynton, Payne, Wassermann, Fritz-Meyer, Manzer, Triboulet and Walker. These indefatigable research workers have settled the fact that rheumatism is caused by a coccus, but whether it is the streptococcus pyogenes or a special streptococcus called the "micrococcus rheumaticus" is still in dispute.

The fact that many cases of rheumatism follow an attack of tonsilitis, otitis media or other streptococcus infections is taken as strong evidence in favor of the streptococcus. Gurich and Schichold (**Journal A. M. A.**, March 19, 1910, p. 1016) have found suppuration in the tonsils almost a constant accompaniment of rheumatic affections. The

germs responsible for many cases of articular rheumatism nest in the tonsil pus and pass thence into the blood.

H. Steinert, in his paper on streptococcus sepsis (*Journal A. M. A.*, October 22, 1910, p. 1510) says: "The sepsis assumes an acute form, as a rule, but in those who have had acute articular rheumatism at any time the sepsis develops in a milder, more chronic form. This suggests that articular rheumatism is a streptococcus disease and modifies the reaction to later streptococcus invasion."

In acute articular rheumatism the organism is sometimes found in the blood in the early stages but I have made numerous blood cultures in such cases, without having succeeded in finding the germ.

I have also made cultures from deep punctures into the swollen tissue around the joints, procuring serum and blood, and have not succeeded in finding the germs. As a rule it is not an easy matter to procure germs from inflamed and swollen tissues where no actual suppuration has taken place. The swollen tissues around a rheumatic joint are usually of such a nature that the infecting organism cannot be found. Since it is so difficult to procure the germ from rheumatic patients, it is practically impossible to make autogenous vaccines for these cases. If the inference is correct that the germs causing follicular tonsilitis are also etiologic factors in rheumatism, the practical way

to procure the germ to make the vaccine is to take it from these sources.

From what we know of the etiology of rheumatism it is not to be wondered at that conventional treatment has had but little influence on the course of this disease. Some still give drugs, with the idea that rheumatism is caused by an excess of certain acids. Baths and bakes are usually given with the idea of sweating out the uric acid and other poisons. A deeper study of these therapeutic measures has led some to believe that heat and baths, as applied in institutional practice, cause an increased phagocytosis, and thus aid in ridding the patient of the infecting germs. Large doses of salicylates, given at short intervals, are also believed to increase phagocytosis. All these remedies work in an indirect manner and are thus of questionable value. Many a rheumatic is advised to go to a sanatorium because the attending physician wishes to shift the responsibility somewhere else.

One characteristic of articular rheumatism is the liability of the patient to relapses, and this is particularly noticeable in cases treated with salicylates. Menzer (*Zeitschrift f. Hyg. u. Infektionskrankheiten*, 1911, lxiii, 296) is of the opinion that the salicylate treatment is largely responsible for these relapses. He considers acute articular rheumatism a streptococcus infection, and by using the salicylates the course of the disease becomes modified in such a manner that the immunizing re-

sistance to the infecting organism is not sufficiently developed to establish a permanent cure.

The curative value of the vaccine treatment is direct, the results obtained being entirely due to the stimulation of the immunizing faculties of the system, and, consequently, such recoveries are more permanent.

My experience in the treatment of rheumatism with vaccine covers a period of a little more than five years, during which time I have treated many cases in almost every form; mild, severe, acute and chronic. I have also been in close communication with many physicians, in person, over the telephone and by correspondence, to whom I have supplied vaccines, thus learning the results obtained in their cases. My personal experience, coupled with my favorable circumstances in being able to obtain information from so many other sources, makes me confident in predicting that the vaccine treatment will be generally adopted in treating rheumatism in the very near future.

Leary (**Boston Medical and Surgical Journal**, October 6, 1910) in this connection says: "The empirical use of vaccines, made from autogenous throat cultures and containing usually a mixture of the pneumococcus and streptococcus, has given usually prompt relief of pain and a bettering of other symptoms in a large percentage of the cases of rheumatism treated." Preston (**New York Medical Journal**, May 27, 1911, abstract from **British Medical Journal**, May 13, 1911) refers to

five cases of rheumatism treated with antistreptococcus vaccine, all of which ended in complete and gratifying recovery.

Dr W. C. Wolverton (*Medical Record*, Oct. 28, 1911) gives a detailed report of his experience with the use of streptococcus vaccine in acute articular rheumatism. Several instances have occurred in his practice which have convinced him of the specific causative influence of the streptococcus in acute rheumatic polyarthrititis. Dissatisfied with the salicylate treatment he began the routine use of streptococcic vaccine in six such cases; and the response to the exhibition of streptococcus pyogenes vaccine was in every case so prompt and satisfactory that he felt impelled to report the cases and to urge others to give the remedy extensive clinical trial. Moreover, in at least four of the cases the salicylate treatment was not followed; and in two cases the patients grew worse in spite of adherence to salicylate treatment; so the uniformly good and prompt results must be ascribed to the vaccine. In every case the temperature quickly fell, there was a rapid cessation of pain and disappearance of signs of inflammation. The patients, moreover, remarked a feeling of exhilaration or stimulation, which came on in from three to forty-eight hours after the inoculation. In no case was there any evidence of a harmful negative phase. In none of the six cases reported did any cardiac valvular lesion develop subsequent

to the employment of the vaccine. The dosage used was 30,000,000 or 60,000,000 streptococci.

Considering the unsettled nature of the question of the specific etiologic microorganism, Wolverton advises the employment of a mixed vaccine containing streptococcus pyogenes and staphylococcus aureus et albus. The vaccines employed in the treatment of the cases reported however were all stock vaccines made from several strains of streptococci.

A diagnosis in acute articular rheumatism is usually made without difficulty, but some cases are met where this is not so readily done. Occasionally the inflammatory process is very slight, revealing little or no swelling, not much pain upon pressure, but with pain on moving the joint. These cases are sometimes very obscure, but where the pain has a tendency to shift and varies considerably in severity from day to day the case can safely be regarded as being rheumatic. It is also often difficult to make a differential diagnosis between inflammatory and gonorrheal rheumatism, and I am satisfied that some cases that have come under my observation had a mixed infection, at least they did not improve until both gonococcus and streptococcus vaccines were used.

To get the best results in acute articular rheumatism, treatment should be started early in the course of the disease. In these cases my most extensive experience has been with streptococcus vaccine, giving 30,000,000 for the initial dose and

children proportionately less. In some cases it is necessary to increase the dose to 60,000,000 or 100,000,000. Recently I have used pneumococcus 40,000,000 in combination with 30,000,000 streptococcus in ten successive cases, but so far the results do not show any special advantage with this combination over the streptococcus vaccine alone. Usually, relief from pain and a reduction in temperature will be observed within twenty-four hours after the first inoculation. If no material improvement should take place the first day, the dose should then be repeated, and, after that, inoculations should be made at two or three-day intervals until the temperature becomes normal and the inflammatory process subsides.

Wright made extensive investigations to determine the relation of pain to the immunizing process during the course of an infection. He found that when the immunizing process becomes effective pain will subside and vice versa. This is beautifully illustrated in many cases of rheumatic fever when streptococcus vaccine is used. When the immunizing influence of a dose of a vaccine takes place, often the subsiding of pain is the first symptom of relief.

I find cases that have never had rheumatism before, respond most readily to this method of treatment, in most cases the symptoms subsiding with two or three inoculations. It is advisable, however, to give three or four doses at from five to seven-day intervals, after apparent recover

to guard against a relapse. Cases in which there were previous attacks, as a rule, run a somewhat irregular course, although some respond very promptly. I have in mind one case that had resisted all kinds of conventional treatment for over a year, four months of which time were spent in a hospital, who responded to one dose of streptococcus vaccine and resulted in a complete recovery. During all this time he had not been free from acute inflammatory attacks in one or more joints. It is now three years since he received that single dose of vaccine, and so far no symptoms of the disease have returned.

The reason that many cases of acute articular rheumatism, that have relapsed from previous attacks, do not respond so readily to the vaccine treatment may be explained on the supposition that during previous attacks many auto-inoculations from infected joints have, in a measure, crippled the immunizing mechanism. We know that such a condition also exists in acne and other chronic infections.

In these cases that do not promptly recover, other joints may become involved with quite severe inflammation, but I have particularly noticed that the inflammation is not so persistent and will subside in a few days. Other new inflamed joints may follow, but will improve again. They run a checkered course, having good and bad days irregularly. In many cases the first indication of permanent improvement is a return of the appe-

tite with good digestion, the desire for food becoming quite pronounced. This is especially noticeable where the patient's digestive organs have been disturbed by the salicylates. It seems that here the immunizing functions of the body are operating to a disadvantage until additional nutrition is added to the system. This lacking factor is provided by a good appetite, associated with active digestion and assimilation. No special diet is required; good wholesome food, and plenty of it, seems to answer every purpose.

A very important feature of the vaccine treatment is that it seems to materially reduce the number of heart complications that so commonly follow acute rheumatism. In an experience covering many hundreds of cases only two heart affections were found. One occurred in a child and the other in an adult. Each was left with a somewhat crippled heart, but, from all appearances both are enjoying good health.

The prolonged anemic, debilitated condition so often found during convalescence from rheumatic fever, following the usual treatment, is not found with the vaccine treatment, and relapses seldom occur after the case has been discharged. If we hope to free humanity of the hundreds of cripples caused by rheumatism, we must cure them before they become chronic, and streptococcus vaccines seem to more nearly fulfill this hope than any other agency at present known.

CHAPTER XIV.

The Chronic Rheumatic Affections.

SUBACUTE RHEUMATISM.

IT IS DIFFICULT to state when a case of rheumatism merges from the acute to the subacute, but when a case has gone along six weeks or more under the ordinary treatment or no treatment at all, it is well to consider such a case as subacute. The results obtained with streptococcus vaccine in these cases varies. Some respond promptly, while others improve gradually, but if treatment is persistently continued they all get better. I have seen cases recover with one or two inoculations, while others require from ten to twenty-five doses. Experience has taught me to give the vaccine at intervals of from five to seven days after having tried shorter and longer intervals between the doses. I have also used larger and smaller doses, but have settled down to 30,000,000 as a good average dose. In some cases it is advisable to increase the dose to 60,000,000 after having used 30,000,000 for several weeks. In many of these subacute cases the appetite, digestion, and general health improves before much improvement is noticed in the inflamed joints, but after the general health picks up, and the patient

gains in weight, the rheumatism improves. As in the acute cases, no special dieting is necessary.

CHRONIC RHEUMATISM.

The question of the treatment of chronic rheumatism has received considerable space in medical literature, and the attitude of many observers seems to presume that rheumatism is essentially an acute infective process which tends toward spontaneous recovery and that in those cases where this tendency is not apparent the case should be classed as arthritis deformans. Since using the biologic method of treatment I have had occasion to see a large variety of cases and nothing has struck me with as much interest as the varying severity and length of time during which a joint may be involved. Not infrequently cases are seen in which there is joint pain with some tenderness on pressure but not enough discomfort to prevent moderate function. Such a condition may last for many months, at times seeming to be practically gone, and again reappearing for a while.

It is quite reasonable to suppose that such a condition is a mild form of infection. Whether it should be classified as chronic rheumatism or as arthritis deformans is not apparent; but that they get better with the vaccine treatment confirms the opinion that even these mild cases are caused by an infective process. In cases where acute articular rheumatism is followed by repeated at-

tacks, and recovery is not complete during the intervals it is fair to consider it as "chronic."

The results obtained in treating chronic rheumatism with streptococcus vaccine are very satisfactory when we consider how inadequate the customary forms of treatment are in these cases. Where the inflammatory process has not been severe enough to materially cripple or enlarge the joint, the results are good. Some cases improve steadily after treatment is started, while others improve for a while and then relapse again, but if treatment is persistently kept up nearly all such cases will get better. Treatment should be continued from two to six months or more if necessary. Where the joints are badly crippled, naturally one cannot expect so much, but even in these cases if we can free the joint from the acute inflammatory process and relieve suffering, much has been accomplished. It is remarkable, however, how Nature will restore these rheumatic joints as soon as the inflammatory process is disposed of.

Dr. E. W. Hall of Attica, Ohio, reports the following interesting case: "On May 1, 1908, Mrs. W. D. applied to me for treatment. I found her suffering from rheumatism, having had three attacks of acute articular rheumatism in the last five years. The knees and ankle joints were almost entirely ankylosed. She had been completely "bedridden" for two years, and could go about on crutches only for the three years previous to the

two years she was continuously confined to her bed. She had been treated by many physicians, some of the best in Northwest Ohio, and had taken every conceivable remedy for rheumatism. It seemed a hopeless case, but as she had never taken any streptococcus vaccine, I concluded to give her a trial of it. After the third dose she began to improve. I have continued this treatment, giving one injection every sixth day. The patient is free from all pain, and is troubled only with a stiffness of ankle and knee joints. This condition is improving with massage and use of the joints, and I expect a complete recovery."

In many of these chronic cases not much improvement should be looked for during the first three months. It seems that in such chronic infections repeated auto-inoculations have somewhat worn out the immunizing apparatus and gentle stimulation is required at quite regular intervals to build it up. From my experience I believe that inoculations made one week apart give the best results.

Sometimes it is well to allow very intractable cases one or two months' rest from their treatment and then start it over again. I have not found that large doses accomplish more good in most cases than the average dose of 30,000,000 streptococci. At times, however, it is necessary to increase the dose to 60,000,000 or more.

I have also used a combination of streptococcus and staphylococcus vaccine in chronic rheuma-

tism and think in most cases it is better than streptococcus alone. Where much anemia is present the response to the vaccine treatment can not be expected to be so good. This is true in acute and sub-acute cases. For the purpose of increasing the blood corpuscles I have used Bannerman's intravenous solution extensively during the past year and find it better than other methods. The average chronic rheumatic has generally gone through so many hardships in the way of treatment, including bakes, baths, rubs, counter irritants, salicylates to saturation, etc., that he thoroughly appreciates the simple injection, especially as it constitutes the sole treatment and comes but once a week.

An improved general condition of the health is invariably observed in these cases and is often the first indication of the beneficial effects due to the use of vaccines. Other treatments, especially drugs, often have an unpleasant tendency to impair the stomach and the general health. No special dieting seems to be necessary. Good wholesome food and plenty of it gives the best results.

ARTHRITIS DEFORMANS.

It is sometimes difficult to make a differential diagnosis between chronic rheumatism and arthritis deformans, but if the following distinguishing characteristics are observed a diagnosis can usually be made. Arthritis deformans generally develops slowly, one joint becoming involved and

successively more joints become swollen and enlarged, the onset being gradual and covering a period of months or years. Chronic rheumatism starts with an acute attack with fever, and usually involves in rapid succession various joints or several joints at the same time, and becomes chronic from repeated relapsing of the acute attacks. Arthritis deformans develops persistently, growing from bad to worse over a period of years. Chronic rheumatism develops from repeated acute attacks. Arthritis deformans involves the cartilaginous and bony structure of the joints causing enlargement with limitation of motion, while chronic rheumatism involves more particularly the soft structures surrounding the joint. Arthritis deformans is not extremely painful unless the joint is manipulated or moved. Chronic rheumatics have spells when the joints are very much inflamed and extremely painful. Arthritis at the start more particularly involves the small joints of the hands, chronic rheumatism shows no particular preference of joints.

The etiology of the disease has been discussed from various viewpoints. Some consider it as a nervous disease, but there seems to be no valid ground for such a contention. The most prevalent idea at present is that the trouble is caused by some irritant either of metabolic or germ origin which circulates in the blood and has a special affinity for the joints. It is difficult to explain why such an irritant in the blood should involv

one or two joints and leave other joints of the same kind entirely free, especially when we consider that in these cases the cartilages are essentially involved, a structure in which there is very slight circulation. It would seem that a substance that is irritating to joint tissues, circulating in the blood would affect all the joints alike, especially those joints of the same kind. In arthritis deformans this is not the case. One or several joints may be involved, while others are free.

A more reasonable hypothesis is that there is a subdued infective process going on in the joint tissues. No germs have been found so far, but any one who has attempted to procure germs from infected tissues that have not actually broken down can readily realize how easily infections may exist without our definitely isolating the infecting organism.

What interests the practitioner most, however, is what can be done with these cases. Conventional treatment admittedly is of practically no value. These cases usually go from bad to worse. Hot baths, sweats, massage and similar treatments not only do no good but seem in some cases to do harm.

When I first began to use streptococcus vaccine in rheumatism, I also used it in several cases of arthritis deformans. Not noticing any actual benefit from the first few treatments, I abandoned the cases. My brother, Dr. A. T. Sherman of Detroit was, fortunately, more persistent and began treating these patients with alternate strepto-

coccus and staphylococcus injections, and kept it up for months. After treating them from three to six months he found that there would be an improvement. During the last two and half years I have used streptococcus and staphylococcus alternately at weekly intervals in some cases, and in others I used the mixed streptococcus and staphylococcus vaccine. At the present time I am unable to say which method gives the best results.

From what information I can collect from my own cases and from those of other physicians whom I have supplied with vaccines I can confidently say that in all cases which have not been of too long standing and bedridden, the results have been good. In cases of only a few years' standing the progress of the disease is not only stayed, but the swollen and inflamed condition of the joints will subside. Where the joints are much deformed and ankylosed not much benefit should be looked for, save that the patient may be relieved from pain.

Some patients will show improvement after the second or third dose but usually not much benefit is noticed for two or three months. The first benefits are evidenced by an improvement in the general health, associated with a good appetite and an equally good digestion. When such a condition is reached the pain and swelling in the joints begins to gradually diminish. There may be times when

the joint conditions get worse for a few days, but this soon subsides again.

When the disease has not progressed enough to entirely cripple the joints, fairly good results may be looked for. After the inflammatory condition subsides, joints that are partly ankylosed will materially limber up with the aid of massage and exercise. When we consider how hopeless these cases are with the ordinary methods of treatment, any material improvement even though it may require a year of treatment to secure it, makes the treatment well worthy of serious consideration.



CHAPTER XV.

Vaccine Therapy in Infected Wounds.

THE SUCCESSFUL HANDLING of infected wounds is a very important factor in general practice. If we could have accurate statistics of the deleterious consequences following seemingly insignificant injuries from infections the showing, no doubt, would be appalling. Many a person has lost a limb or his life as a consequence of such an infection that was not brought under control.

Abrasions of the skin from slight cuts, scratches, needle pricks, thorn pricks, tramping on a nail, etc., are of such common occurrence that ordinarily they are disregarded and heal without any special treatment; but not infrequently these trivial injuries become infected with virulent pathogenic organisms, and the patient, after trying various home remedies, consults the family physician for treatment. Usually in such cases the infection has extended beyond the reach of local antiseptics, and the constitutional resistance to prevent the infection spreading is the most important factor to be relied upon.

In cases of more extensive injuries a physician is generally called to take care of the fresh wound, and even in such cases, where the utmost care is

taken in cleansing the wound with antiseptic solutions and dressings, infection sometimes takes place. Often wounds are penetrating or lacerated to such an extent that thorough cleansing to the point of an aseptic condition is impossible.

In treating wounds the possibility of a tetanus infection should always be kept in mind. This may be determined by the character of the wound and the circumstances surrounding the receipt of the injury. If the wound is superficial and has not been bandaged to exclude the air, a tetanus infection is not liable, because the germ, being anaerobic, will not grow when exposed to the air. The tetanus bacillus is particularly prevalent in rich soil and barnyard manure, and deep wounds exposed to such filth should always be regarded as being in danger of a tetanus infection. The tetanus bacillus causes very little, if any, local disturbance in a wound, and often, in a few days, disappears from the point of infection, while recent investigations tend to show that it continues to grow in the nervous system.

Wounds caused by toy pistols in the hands of boys are particularly favorable to tetanus infections. The character of the dirt on the average boy's hand makes the presence of the tetanus bacillus always possible. The force of the explosion makes a small penetrating wound, carrying the dirt deep enough into the tissues to exclude the air, so that the tetanus bacillus can develop.

2. Since the germ causes no material dis-

turbance, the injury is disregarded until constitutional symptoms develop. Wounds accompanied by much local disturbance, inflammation, pain and swelling in the absence of tetanic symptoms can safely be regarded as not being due to tetanus infection.

In all cases where a possible tetanus infection is suspected antitetanic serum should be given without delay. The prophylactic value of this serum is well established, while its use as a curative agent, after the constitutional symptoms have developed, is not so pronounced.

After having excluded a possible tetanus infection, the question naturally arises as to what the infecting organism is. In many instances this can be determined by making a bacterial examination of the purulent matter discharging from the wound, but in most cases it is essential that treatment should be started at once to immunize the patient against the infecting organism and to prevent the infection spreading, and to make a bacterial examination usually means twenty-four hours' delay. Furthermore, the wound is often of such a character that the infecting organism can not even be found. In the case of a penetrating wound made by tramping on a nail the germ causing the trouble may be carried deep into the foot, while the germs found at the point of entrance may be entirely different. In many cases where the skin abrasion was slight the original wound may have healed over, while the infectior

is progressing in the deeper tissues. In such cases a bacterial examination would also be impossible.

In this connection we should keep in mind the most probable dangerous organism, the streptococcus, and also the more probable but less dangerous staphylococcus. Bacterial examinations in these cases are always desirable, but ordinarily a diagnosis made from clinical symptoms is sufficient for the successful administration of the vaccine. Infections that spread rapidly can safely be considered streptococcic, especially if there are evidences that the inflammation is following along the lymphatic channels, leaving red chains. Staphylococcus infections are more closely confined to the point of infection and spread much more slowly. By far the most common occurrence is a mixed infection of both organisms.

From these considerations it would seem that the most practical thing to do is to give the patient a dose of combined streptococcus-staphylococcus vaccine at once. Again the objection is raised that such procedure is not scientific, because a vaccine might be given where no corresponding infection exists. In this connection it must be remembered that an average dose of vaccine, if given where no corresponding infection exists, is entirely harmless, having no effect save the raising of the immunizing power against this organism. This is an advantage, because it serves to fortify the individual against a later possible infection by these ever-present micro-organisms.

Delay in giving the vaccine is dangerous because, if the infection should extend rapidly, enough toxic material may be absorbed to paralyze the immunizing mechanism so that it can no longer be aroused into activity. For this very reason it is not advisable to use autogenous vaccines in the early acute stages. Nor should treatment be delayed to make a bacterial examination. The clinical symptoms in such cases are sufficiently clear to indicate what vaccine to use, until a bacterial examination can be made to verify the diagnosis if deemed necessary.

In cases of more extensive wounds that have been cleansed, stitched up and dressed, by a physician, where there is the least suspicion, a day or two later, that an infection exists, a dose of streptococcus-staphylococcus combination vaccine should be given. This will raise the immunizing power at once and retard or abort the infective process. I find that 30,000,000 streptococcus, combined with 100,000,000 of each staphylococcus aureus and albus, is a good average dose. Ordinarily the injection may be repeated on the second or third day. If no noticeable improvement is observed within twenty-four hours the dose should be repeated.

As a general rule, inoculations should be made at shorter intervals in cases of severe infections than in milder ones. Improvement, with a few exceptions, should be observed within twenty-four hours after the first inoculation.

The success attained with this method is so positively beneficial that no case of infected wound should be treated without the use of vaccines, especially when a case is seen early in the course of the infection. This is very important. In the early stage of an infection we are never in a position to know how the immunizing mechanism will respond. If it should be sluggish the infection may spread enough to do considerable damage before the patient is seen again. Where an infection has gone on for some time and the case is progressing favorably the indications would be that natural immunity is being established making the use of vaccine unnecessary. Nor should a case be considered too trivial to use the vaccine because small affairs are often very important to the individual concerned.

The following case is a good illustration: Miss G. H. a professional pianist slightly pricked her middle finger at the root of the nail with a needle. Four or five days later her finger was considerably swollen and so painful that she was not able to use it. The following day she consulted me. Careful examination did not indicate the presence of pus. I gave her a dose of streptococcus-staphylococcus combination vaccine and advised hot water compresses as a local dressing. The next morning it was distinctly evident that there was pus under the root of the nail, the lunula appearing yellow. A small cut through the nail at this point established drainage and, for the location, considerable

pus was discharged. The pain and inflammation subsided almost at once. The pus dried up and the inflammation disappeared so it enabled her to be back at the piano doing concert work the next day without material inconvenience. In all she was kept from her work only three days—the day before I saw her, the day the vaccine was given, and the day the abscess under the nail was opened.

I saw this lady recently and found a new nail growing, which shows that the infection had done considerable damage. Under conventional treatment extensive infections at the root of the nail are usually very tedious. Without the use of vaccines it would probably have required from two to four weeks' time to accomplish what was done by this method in two days. To a professional musician this was a matter of very great importance.

Another very important factor in treating abrasions of the skin is the application of vaccines in burns. The painful condition of burns presents two distinct stages, the pain caused by the burn itself which usually subsides during the first day, and the pain caused by the infections present in the burned area from germs normally on the skin. Of course these infections depend largely on the extent and depth of the burn. The virulence of the infecting organism and immunizing response of the patient must also be taken into consideration. In these cases staphylococci are the most constant infecting organisms although

streptococci are also found. Such infections are not only responsible for most of the pain, but much of the fever, rapid pulse and other depressed conditions as well. Where vaccines are used in these cases the immunizing mechanism is stimulated and a high state of immunity established. This not only relieves the patient of much suffering but aids in the healing process as well. In deep burns where the entire depth of the skin is destroyed, the pain caused by these infecting organisms during the time required for the destroyed tissue to separate from the living is usually quite severe. Here the vaccines are a decided aid. Here is an illustration: Miss S. K. working in a laundry got her hand in a mangle. The hand was badly crushed and horribly burned. Before the machine could be reversed and the hand removed the entire top of the hand was burned so severely that the skin, all the tendons, and a part of three meta-carpal bones sloughed away. A few days after the accident the hand became very much inflamed, swollen and painful, the inflammation showing more particularly at the margin of the burn. Considering the condition to be largely due to infecting organisms I gave a mixed streptococcus-staphylococcus vaccine. By the next day she was relieved of the pain and the swelling was not so intense. Four days later the hand became more painful again and another dose of vaccine was given with the same favorable result. Inoculations were continued at from four to six-day in-

tervals until the slough was removed and during all this time she suffered practically no pain and was able to sleep regularly at night. With the aid of extensive skin-grafting the hand healed rapidly and a good recovery resulted.

It must be remembered that vaccine treatment in these cases will not in the least interfere with any local or other treatment that might be desirable. Rest in these cases of infection is always advisable. It has frequently been demonstrated that fatigue has a marked influence in lowering the immunizing powers against pathogenic bacteria.

I feel very confident that bacterial vaccines are the most valuable remedies at our command in treating infected wounds, especially when it is possible to use them early in the course of the infection.



CHAPTER XVI.

Puerperal Infections.

FEVER A FEW DAYS after a confinement is always regarded with apprehension, because it may be the first indication of the development of a dangerous infective process. While it is true that we often have a rise of temperature in these cases, which subsides spontaneously in a few days, yet it is just this hope that nothing serious will happen that is often responsible for the delay in giving efficient treatment until it is too late to secure beneficial results.

From an anatomical standpoint one could hardly imagine a more favorable condition for the development of a serious infection than the womb presents after a confinement. A large, blood-filled organ, with an extensive excoriated area from the previous placental attachment, it has much tissue and surface available for germ development, and the fact that the organ is undergoing subinvolution resulting in a lowered vitality which also favors the infective process. The irregular inner surface of the womb with its many folds is an ideal incubator in which the infecting organisms may develop, and being located in the abdominal cavity, the infection may readily ex-

tend to the peritoneum, with a resulting general peritonitis.

In some cases the infective process develops much more rapidly than in others, depending on the relative resistance of the patient and the virulence of the invading organism. In these cases the infection is always local before it becomes general, and to decide just when general infection takes place is practically impossible.

Local treatment, with the object of destroying the infection, is at best difficult to carry out, because the entire surface of the uterine cavity cannot be reached. Curetting, unless very carefully done, may do more harm than good by exposing new surfaces for infection and by unavoidably manipulating an inflamed organ. If the infection has extended into the uterine tissue it cannot be reached by any local treatment. On this question Professor J. H. Carstens says (*Journal A. M. A.*, August 6, 1910, p. 476):

"The point I want to make is simply this, that by local treatment more harm is often done than good. Douches given by ignorant persons often implant new and virulent micro-organisms within the genital tract, while scraping and curetting and injuring the delicate mucous membrane opens new channels for absorption.

"When a localized abscess is formed which can be opened into the cul-de-sac of Douglas or somewhere else, I certainly believe it should be promptly opened; but as we see the disease generally sev-

eral days after its onset, I think no local treatment will be of any avail.

"I have been all the more desirous of bringing this view before our section since reading the proceedings of the last German Association of Obstetricians, where Winter, in an exhaustive article, shows this most clearly, coming to the conclusion that simple absorption ceases as soon as the necrotic tissue is cast off; that simple local infection and endometritis stops soon without any treatment; that no local treatment will prevent deep or general infection, and that when absorption takes place and there are remnants of tissue still in the uterus, one should be tardy about removing them, as these are generally quickly cast off and the patient gets along just as well as with the most vigorous treatment."

From these considerations it should be evident that, unless the systemic resistance is sufficient to prevent the infection spreading, our case is almost hopeless. Naturally under such conditions the treatment should be directed toward rendering the individual immune to the infecting organism. For this purpose bacterial vaccines are the most efficient means at our command. As might be expected the best results are obtained when the vaccine is used early in the course of the infection before it becomes general.

Beckwith Whitehouse in a paper read before the Birmingham Branch of the British Medical Association, March 16, 1911, referred to the early

use of vaccines in these terms: "To obtain the very best results it is most essential to attack the disease at the earliest opportunity. Too often valuable time is lost at the commencement of infection, time that can never be regained; and when at last vaccines are employed they are but doomed to failure. To be of service a vaccine must be administered at the first possible moment, and before the micro-organisms have multiplied to any great extent in the blood stream. During the last twelve months in hospital and private practice I have treated twelve cases of severe puerperal infection by the vaccine method, and the importance of early treatment has impressed me much. Nine of the patients recovered and three died. Of the latter, two came under observation only on the day before death occurred, and a vaccine was employed simply as a last resource. The third patient received her first dose of vaccine on the seventh day of the disease, and although a well-marked reaction followed each dose, active immunization failed to check a severe attack of pneumonia, which proved fatal on the twelfth day after treatment. Of the cases that recovered, success was most marked in those patients to whom access was obtained at the commencement of the attack.

"The first step in the bacteriological examination should be the preparation of a carefully stained film of the uterine secretion. In the early stages of an infection it is frequently possible to

identify a few streptococci at once. Although not abundant, they are not obscured by the multitude of micro-organisms seen in a film taken during a late stage in the disease. Should streptococci be found a stock vaccine must be administered at once. The ideal agent for treatment is, of course, an autogenous vaccine, but where such cannot be obtained, or where it is important that time be not lost, a stock preparation should be employed. A film preparation, therefore, will give the key to treatment several hours before a culture is available; and in severe infections every hour is of importance, for it is impossible to tell when a local lesion will become generalized; or, in other words, when organisms first reach the blood stream."

These puerperal cases give us some of the most beautiful illustrations as to what can be accomplished in the early stages of dangerous acute infections with bacterial vaccines. Time and again patients are seen where the fever and other symptoms indicate the development of serious trouble which clears up like magic after one or two inoculations. This may be regarded by some as simply an expression of over-enthusiasm, since it is known that many cases of simple postpartum infection recover spontaneously without any special treatment. Even after allowing for all such cases there is no room left for doubt as to the tremendous advantage of this method of treatment. During twenty-eight years of active city practice the writer has had ample opportunity of observing

the course of puerperal infections before and after using the vaccine. There is no room for reasonable doubt. Even in those cases where spontaneous recovery takes place there is often a prolonged debilitated condition before the normal vigor is restored. Where the vaccines are used a characteristic promptness in the improvement is observed. This is not only the case with the milder forms of infection but the more serious cases as well.

Dr. McColl of Detroit, consulted me with regard to a case that illustrates this very nicely. The patient was young, had had a very hard labor. Large child, breach presentation and difficult instrumental delivery. The doctor used all aseptic precautions as regards cleansing, and wore rubber gloves. On the fourth day the patient developed a temperature which continued to go up until on the tenth day it reached 105 degrees. There was much tenderness over the abdomen and much tenderness and swelling in the pelvic cavity. Bacterial examination by the Detroit Clinical Laboratory showed pneumococci and staphylococci. I supplied a vaccine which he gave to the patient at once. The next day the temperature had dropped to 101 and the patient felt much better. On the evening of the same day, however, the temperature rose again to 102.5. I advised giving a pneumococcus-streptococcus-staphylococcus combination, assuming that a streptococcus might be present which was not found in the examination.

After giving this combination vaccine, of which she received two doses, the patient steadily improved and in less than a week she was sitting up in bed with temperature normal, pain in abdomen gone, and, considering the severity of the illness, was feeling very well.

Many cases of infection occurring where aseptic precautions were observed, are no doubt due to auto-infections. The following case treated by Dr. A. Schnell of Detroit was no doubt an auto-infection: The woman gave a history of having had facial erysipelas three times, the last time two months previously. On the day of confinement there was some inflammatory redness on one cheek but this subsided. The labor was such that instrumental delivery was necessary. On the second day after the confinement a temperature of 105 had developed with the pulse at 130. With the idea that there might be some retained placenta the patient was taken to St. Mary's Hospital and curetted but nothing was found. A dose of stock streptococcus and staphylococcus combination vaccine was given. The next day no material improvement was observed. I was then consulted and basing my judgment on the history of the case a stock streptococcus erysipelatis vaccine was given. The day following the temperature was 100 with other conditions improving proportionately, and two days later it was down to 99. Three doses of streptococcus erysipelatis vaccine were given at two-day intervals when the temperature

became normal and the patient was feeling quite well. A week later, however, the temperature shot up to 105 again. The same vaccine was once more resorted to with very gratifying results. In two days the temperature was down to 100 and with three more inoculations at two-day intervals the case went on to complete recovery. This case was unusually severe from the start and a relapse taking place when the vaccine was discontinued with prompt recovery after using it, again conclusively shows the value of this method.

When it was six days old the baby also contracted erysipelas. It was treated with the same vaccine and after three inoculations at two-day intervals made a good recovery.

As might be expected, there are a variety of germs responsible for infections during the puerperal state, but the most dangerous (with the very rare exceptions of the diphtheria or tetanus bacillus) that should be particularly guarded against is the streptococcus. Streptococcus infections in these cases often progress very rapidly. Hence the vaccine treatment should not be delayed.

As soon as a uterine infection is suspected, as indicated by a rise in temperature, rapid pulse and the character of the discharge, a dose of streptococcus vaccine should be given. It is not advisable to wait for a bacterial examination of the uterine contents before giving the vaccine, because that means delay—and delay here is often just as dan-

gerous as to postpone treating diphtheria with antitoxin while waiting for the report of a bacterial examination of a throat culture. Nor should treatment be postponed until an autogenous vaccine can be made, because, meantime, the infection would be liable to progress where it could not be brought under control. A good stock vaccine will serve the purpose much better.

Where facilities are at hand bacterial examinations of the uterine discharge should be made to verify the diagnosis. This is conveniently done by inserting a speculum, cleansing the os with sterile cotton, and then passing a small sterile swab into the uterine cavity, being careful not to touch the speculum or anything else with the swab while removing it. With this swab smears may be made and culture tubes inoculated for further examinations.

In puerperal infections the colon bacillus is also often found. Where the colon bacillus is present there is a foul odor to the discharge. In such cases colon bacillus and streptococcus combination vaccine should be used; colon bacillus 40,000,000, streptococcus 30,000,000. Inoculations should be repeated the same as indicated above where streptococcus and staphylococcus combination vaccine is used.

A colon bacillus infection is frequently the principal factor in preventing union in many cases of lacerated perineum after confinement, no matter how carefully the parts have been brought to-

gether by appropriate stitching. In these cases colon bacillus vaccine is of inestimable value, used as a prophylactic just after the confinement. The following is a good illustrative case:

Mrs. A. K. had been confined once before, at which time the perineum was lacerated into the rectum and neglected, so there was no union. Delivery in the second confinement was normal, but the small remnant of perineum was lacerated into the rectum, the tear extending nearly two inches upward. As the torn surface was small, I dissected away enough mucous membrane to make a proper perineum after stitching the parts together. The tear above the perineum was stitched with twenty-day catgut and the perineum was united with silkworm gut. For some reason the stitches made with the catgut gave way during the second day, leaving a rectovaginal fistula, through which the fecal matter passed freely into the vagina. A more unfavorable condition for healing a lacerated perineum could hardly be imagined. I gave the patient colon bacillus and streptococcus combination vaccine from the start, making four inoculations at three-day intervals. There was no local treatment employed. There being almost a continual discharge cleanliness was altogether impossible. Very little inflammation followed, resulting in a good union of the wound and sphincter muscle. The stitches were removed on the thirteenth day, when there still existed a rectovaginal fistula. Two weeks later, however, to my

surprise and gratification, the fistula had closed. This is an extreme case, but it aptly shows how these vaccines will prevent bacterial invasion by raising the systemic immunizing power.

Staphylococcus infections are also common after a confinement, but they are not so serious, as this organism has a tendency to confine its operations more particularly to the point of infection. In many cases we have mixed streptococcus and staphylococcus infections and for this reason it is advisable to use a mixed vaccine containing an average dose of both organisms, 30,000,000 streptococci and 100,000,000 each of staphylococcus albus and staphylococcus aureus. The results with this treatment, when used early, are almost invariably satisfactory. The temperature and pulse usually drop to normal in twenty-four to thirty-six hours. If no material improvement is observed in twenty-four hours the dose should be repeated. Where the temperature has been down and rises again a few days after the last inoculation, with other symptoms indicating that the patient is not doing so well, the dose should then be repeated.

The vaccine treatment is not contra-indicated in advanced cases of puerperal infection. Physiological doses of bacterial vaccines are non-toxic and harmless. Where the patient is suffering from extreme toxemia not much should be expected, but even in these cases the prompt administration may turn the tide and save the patient.

CHAPTER XVII.

Prophylactic Inoculation in Obstetrical Practice.

THE PROPHYLACTIC USE OF VACCINES in midwifery is of great importance because there is always some danger of infecting the patient while making the necessary examinations and there is unquestionably some danger of infection from germs normally found in the genital tract. Many cases of virulent puerperal fever occur in cases where delivery was entirely normal and no examination had been made. From an extensive review of the literature on the bacterial investigations of the germs found in the vagina of pregnant women by A. W. W. Lea in his most valuable book on Puerperal Infection it would appear that streptococci are found in about twenty per cent. of the cases. No doubt a large majority of these organisms are not virulent and exist in the vagina as saprophytes but from microscopic examination and laboratory tests they can not be differentiated from streptococci derived from severe infective process. It is not at all unreasonable to suppose that in many cases these organisms become active and produce fevers of a mild types, while in exceptional conditions where the immunity of the patient is low they may cause

a serious septicemia. Staphylococci, colon bacilli and other organisms are also frequently found.

We know that serious infections depend on two factors: the virulence of the organisms and the susceptibility of the individual. Thus organisms of low virulence may cause serious infections in very susceptible individuals, while more virulent organisms would cause but little or no trouble in nonsusceptible persons. So in the last analysis immunity to these infecting organisms is an all-important factor.

Where there is so much opportunity for infection as presents itself in puerperal cases, the question of prophylactic immunization with bacterial vaccines naturally suggests itself. In most deliveries more or less laceration of the cervix or perineum takes place with the resulting opportunities for infection. Besides this one cannot overlook the inherent possibilities of the placental surface as an excellent culture medium for those germs which may chance to lodge there.

A good and perfect union of these lacerations after delivery is a very important factor in the completeness of the recovery after a confinement. It does not require much of an infection to prevent perfect union of lacerated tissues. Organisms of low virulence may suffice to do much mischief here. With the use of bacterial vaccines the body resistance to infecting organisms can be materially raised and midwifery presents a condition

where the principal of prophylactic immunization should be taken advantage of.

Dr. H. L. Ulrich of Detroit informs me that he has used combined streptococcus-staphylococcus vaccines in about one hundred cases of confinement as a prophylactor with entirely satisfactory results. He gives the vaccine not later than one day after the confinement. One case of postpartum hemorrhage deserves special mention. The necessity of removing blood-clots and breaking off adherent pieces of placenta made frequent insertion of the hand into the uterus necessary. A dose of vaccine was given and not the slightest fever or local infective disturbance developed. A week later another hemorrhage took place which required more intra-uterine manipulation with the additional risk of infection. A second dose of vaccine was given and an uninterrupted recovery without fever took place.

Dr. R. L. Pfeiffer of Detroit informs me that he has used the vaccines in this way during the past eight months giving a dose in every case not later than a day after confinement. He says that during this time he has had several cross presentations and other conditions which required much manipulation, but no infective trouble developed. He finds that cases receiving prophylactic doses of vaccine are more vigorous and do better generally than those not receiving vaccines. His experience with vaccines in the adjunct treatment of lacerated perinei shows that better and more prompt union

takes place after stitching the parts than where no vaccine is used. In these cases he gives streptococcus-staphylococcus and colon bacillus vaccine. He is so favorably impressed with the prophylactic value of vaccines in midwifery that he would not confine a case without using them.

From what information may be obtained by a study of the literature on this subject and from my own observations, I am confident that we have no other means at our command that will so effectively avert dangers and unpleasant consequences in puerperal infections as the timely use of bacterial vaccines.

I cannot impress the fact too strongly that these means can be advantageously used as prophylactors as well as curative agents, and every physician would do well to have them on hand for immediate administration. They are not expensive, retain their potency for a long time, and are without the least iota of danger.

Streptococcus, staphylococcus and colon bacillus infections are so common that occasions for advantageously using these preparations are almost daily met with by the general practitioner.

MASTITIS.

Mastitis is one of the disagreeable and sometimes serious complications met with in obstetric practice. The mammary gland during the first week after confinement seems to be particularly susceptible to infections. This is probably due to

an infecting organism developing in some of the milk ducts and from there extending into the tissues. The most usual organism found in these cases is the staphylococcus, though streptococci are also found. When any portion of the gland becomes inflamed and feverish, it is a sufficient clinical indication that an infection is going on, and the necessity of using a vaccine is apparent. A dose of streptococcus-staphylococcus vaccine should be given at once to immunize against these organisms. This is being successfully done with very gratifying results.

PHLEBITIS.

Phlebitis is not uncommonly seen before and during confinements, especially in cases of varicose veins, and for this reason this ailment deserves mention here. The staphylococcus is usually the infecting organism although other germs may also be present. Streptococcus-staphylococcus combination vaccine when used in these cases gives the best results. I have seen conditions after confinement, which from the extent of the veins involved promised to cause serious trouble, disappear after two injections of streptococcus-staphylococcus vaccine. One case occurred in a woman during the seventh month of gestation. The veins of one leg had for some time been varicosed and at this time became extensively inflamed. She was very much alarmed on account of a very tedious recovery from the same trouble

on a previous occasion. I assured her that the vaccine method of treatment would avoid any serious complications and thus relieved her mental state. After two inoculations at five-day intervals the entire inflammatory process subsided and she went on to full term without further trouble. The same treatment should be equally applicable in other cases of phlebitis.

THROMBO-PHLEBITIS.

In thrombophlebitis we have a condition that usually develops from an infection of thrombi in the veins beneath the placental site, or from the pelvic veins which extend from thence to the larger veins. This may readily produce an extensive thrombosis. Frequently small blood-clots in the pelvic veins soften and the broken-down substances enter the blood current setting up a pyemia or septicemia. Staphylococcus, streptococcus or, at times, both organisms are usually found. This condition usually sets in during the second week of the puerperium, the infection, which is often of a mild character, gradually extending along the veins. If such an infection were aborted in this early stage by the use of vaccines, thrombophlebitis and its attendant pain and danger would be avoided. Where extensive thrombi develop the condition is always very serious. Here we have a condition of a general infection combined with the plugging of large veins which interferes with the proper circulation of the blood in the leg, favoring

the formation of metastases. From the serious character of the infection a high mortality rate under conventional treatment should be expected. Lea (*Puerperal Infection*, p. 178), places the average mortality at 60 per cent.

Dr. A. P. Ohlmacher of Detroit informs me that he has treated three severe cases of thrombophlebitis resulting from puerperal infections with autogenous vaccines which he prepared from the streptococci isolated from the patient's blood. They all made good recoveries. He also told of a case of thrombophlebitis occurring in a man during the relapsing stage of typhoid fever which he treated with vaccine. He isolated typhoid bacilli from the patient's blood from which he prepared the vaccine used on the case. This case was so far advanced that any method of treatment appeared hopeless but improvement was observed in 24 hours after using the first dose of vaccine and he ultimately made a complete recovery.

Dr. A. G. Huegli of Detroit courteously gave me the following case report.

"On Dec. 1, 1911, I was called upon to treat Mrs. Otto K., age 26, who three weeks previous had been instrumentally delivered of her second child. The accouchement, I am told, was tedious and difficult. However, no lacerations nor uterine sepsis occurred. On the 10th day violent pains shooting down both lower limbs, chills, fever and a slight swelling of both thighs proved to be the onset of a thrombophlebitis of no small extent. The patient

became very ill. Her attending physician summoned an expert consultant. Her condition grew steadily worse and her first physician was discharged. A homoeopath was called, who later giving the relatives a hopeless prognosis, was also discharged.

"Two weeks after the onset of the phlebitis I found her in this condition: Extremely anemic, pulse 120, temp. 101, cough, expectoration, passive congestion of lungs, no cardiac lesions, slight tenderness over uterus, moderate swelling of both thighs, legs and feet. Exceedingly painful spots in calves, middle of thighs, and also over the left sacro-iliac fossa, where later an abscess developed and was drained. Cramps in the abdomen accompanied frequent diarrhoea.

"The following routine treatment consisted in giving at different periods as required, digitalis, strychnine arsenate, iron, pepsin, gentian, hydrochloric acid, opiates and laxatives. Both limbs were painted twice daily with a 20% Ichthyol solution and swathed in bandages.

"I attribute her complete recovery chiefly, however, to the use of stock vaccines which were administered early in my treatment. They consisted in a mixture of streptococcus 30,000,000 and staphylococcus 100,000,000 prepared by Dr. G. H. Sherman. Two such injections were given at an interval of four days. After each a slight exacerbation of all symptoms took place with temperature rise of 2 and 3 degrees and delirium. A

most noticeable improvement soon followed and on the 31st of January, 1912, I discharged her from my care as recovered."

These results are certainly a sharp contrast to those obtained under the operative and other forms of treatment.

One case of thrombophlebitis in a man who came under my care recently deserves mention here. This was really a subacute affair, for no fever was observed at any time. The large veins of the upper part of the leg were evidently thrombosed as indicated by the tremendously swollen condition of the leg and the engorgement of the venous circulation. Treatment consisted of absolute rest in bed and the use of combined staphylococcus and streptococcus stock vaccines at five to seven-day intervals. Absolutely no metastases or other infective conditions developed in the leg. It took two months before proper circulation was re-established in the leg, but the result was recovery.



CHAPTER XVIII.

Vaccines in Every-day Gynecology.

FULLY ONE-HALF of the work of the general practitioner consists of the treatment of gynecologic affections, and nine-tenths of this is caused directly by infection.

If the reader will pause a moment and consider the frequency of "itises" in the nomenclature of the conditions which he has to meet in this part of his practice, he will readily admit that if the philosophy of vaccine therapy is reasonable and the possibilities for controlling infections in other parts of the body are real, there are possibilities for much effective work in the treatment of the common diseases of women by means of bacterial vaccines.

Let it be understood that the uses of bacterial vaccines for the treatment of a local infection, say, on the arm, influences any similar infection elsewhere in the body—the whole resistance of the patient to that particular organism is raised. This is the reason why one frequently comes across patients who, being treated for some remote infection, notice changes for the better in a pelvic disorder which was bothering them but about which they had said nothing to their physician.

If the advantages to be gained by bacterial in-

oculation in female diseases are as real as accidental manifestations have made them, why should it not be just as proper to avail oneself of this method of treatment when the problem is to overcome some pelvic infection alone?

It is admitted that circulatory disturbances play a very important part in the causation of this class of disorders. It is not necessary to emphasize the importance between the relation of a large, flabby, sub-involuted uterus to an endometritis or, for that matter, a metritis. The soggy uterine walls with their stagnant blood are an excellent camping ground for hordes of pathogenic and non-pathogenic micro-organisms.

Already the subject of the treatment of puerperal sepsis has been referred to in another part of this book, but, unfortunately, the ratio of other forms of infection, as compared with the occasional postpartum case is immense. Many millions of women in this country are suffering from pelvic infections, ranging from the serious Neisserian infections, with their immense possibilities for physical and social harm, down to the ordinary "whites" of which so little is thought until the associated troubles which invariably come sooner or later, drive the woman to her physician.

It would seem that no class of diseases could afford a better field for successful vaccine therapy, than the every-day gynecologic infection. Frequently the hyper-sensitive woman refuses either examination or local treatment, and there is no

doubt that many of these cases could be treated with vaccines on general principles and materially benefited or cured.

The use of stock vaccines in metritis, endometritis, cervicitis, vaginitis and vulvitis, not to mention the more remote pelvic infections, such as pelvic abscess or salpinigitis, with the occasional ovaritis will be found to be an efficient adjunct measure and, therefore, well worth serious consideration.

It is not necessary for me here to dwell upon the causative organisms or the particular vaccines which may be necessary. It stands to reason that the staphylococcus is a prominent factor. The streptococcus is frequently present, and when it gets a firm hold it is always serious enough to bring the woman to your office. The colon bacillus is very commonly a cause of pelvic infections, for the reason given before, that the stagnant atonic organs permit of what is termed by pathologists "infection by contiguity."

Then there is the diplococcus of Neisser, with its appalling death rate, its innumerable surgical complications and broken hearts. Every thinking physician knows that the gonococcus infection in the female is ten times worse than the corresponding infection in the male, but fortunately, the reacting powers of the blood—its opsonic producing qualities—is usually as great in either individual. For this reason it must be clear that the vaccine treatment of specific pelvic infections in women

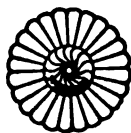
will eventually become our standard means of combating this great scourge.

Many cases of persistent uterine infection with the common but nevertheless unpleasant discharge are amenable to vaccine therapy. An autogenous vaccine many times will reorganize a woman's entire life. Atonic pelvic conditions are modified, painful menses are rendered normal or so much nearly normal that the patient is loud in her praises of her medical adviser, remote conditions reflexly connected with the pelvis disappear and the sexual life is entirely changed.

It should be remembered that many women suffer from the results of the hyperactivity of perfectly normal saprophytic bacteria. The tone of the uterus is lost, its blood stagnates and the one-time harmless germs become a menace to health and an added source of local trouble. Particularly is this true at the time of menstruation. At this period the resistance is lowest and many a serious infection which resulted in enlargement, exudation and eventual displacement, has begun with a simple unsuspected infective process which might have been headed off by judicious recourse to vaccine therapy.

It is well known that infections of the remote reproductive organs are hard to reach, but since vaccine therapy "works from within" and a definite resistance to these organisms may be fostered by judicious bacterial inoculation, there is hope for many in this method.

While I am very sensible to the importance of vaccine therapy in the treatment of gynecologic infections, it should not be understood that I recommend vaccine injections as a panacea. Vaccine therapy always deserves adjunct treatment and where possible other orthodox local measures should be used, the great advantage of vaccine therapy depending upon the fact that all such adjuvant measures are rendered infinitely more effective.



CHAPTER XIX.

The Vaccine Treatment of Gonorrhea in Women.

INFECTIVE inflammatory conditions of the womb its adnexa and the pelvic tissues according to leading authorities are caused by the gonococcus in fully seventy-five per cent of known cases.

Staphylococci, streptococci, colon bacilli and other organisms are also found frequently. More often we have mixed infections of two or more of these germs. In the absence of a definite history of gonorrheal infection it is often difficult to make a diagnosis.

Gonorrhea in woman usually assumes a sub-acute form even in the early stages, often causing so little distress from the urethral infection that it is entirely disregarded and no disturbance will be observed until the infection has extended into the uterus with the inevitable leucorrhea. During this stage there is seldom much constitutional disturbance and not enough inflammatory action to cause much pain in the pelvic regions. Bacterial examination is of great aid in making a diagnosis but a negative result is not conclusive, because gonococci may no longer be present in the discharge although the infection may be rapidly extending into the Fallopian tubes. After the infec-

tion has reached the Fallopian tubes there is more inflammation and pain, often associated with considerable constitutional disturbance and fever. During this time there usually is pus formation and, in cases where the inflammatory process seals up the opening, the pus accumulates in the tubes.

Operative interference in the early acute stages is now generally regarded as not advisable on account of the danger involved and because many of these cases recover spontaneously and thereby save important organs that would otherwise be sacrificed. It is found that in from four to six months the pus in these tubes usually becomes sterile when operative methods may be employed without much danger of extending the infection. From this brief consideration of the usual course of a gonorrheal infection in women, it will be seen that the progress is comparatively slow and not associated with a great amount of inflammatory activity. This is of diagnostic value because it is in sharp contrast to streptococcus or colon bacillus infections of the pelvic organs where rapid development of the inflammatory process associated with much pain, swelling, fever, and constitutional disturbance is the rule. A staphylococcus infection does not cause much pronounced disturbance and in gonorrheal cases is usually found associated with the diplococcus of Neisser.

The gonococcus is an organism that confines its operations largely to the mucous membranes and being a surface infection it does not produce suf-

ficient impression to adequately stimulate the immunizing mechanism. After the infection has extended into the Fallopian tubes, more constitutional disturbance is created and a gradual development of an immunity ensues with an occasional subsequent spontaneous recovery. The difficulty with this procedure, however, is that often the infective process does so much harm before an immunity is established that permanent injury follows.

By using a vaccine the immunizing mechanism may be stimulated into activity during the early stages of the disease, thereby either aborting the infective process or so modifying it that no serious harm is done.

In successfully handling these cases the appreciation of mixed infections is a very important factor. Staphylococci are most frequently associated with gonorrheal infections and where not present they are liable to become a complicating factor at any time. For this reason it is advisable to always use a combined gonococcus-staphylococcus vaccine from the start.

The following report is an average one:

Mrs. D. had been married about four months when she complained of leucorrhea with pain in the pelvis. Examination showed a marked enlargement and inflammatory condition of the Fallopian tubes with considerable muco-purulent discharge from the uterus. Bacterial examination revealed gonococci. Her temperature was 100.5, but she

felt quite well otherwise. Previous to marriage she had always enjoyed perfect health. Treatment was started with gonococcus 30,000,000, staphylococcus 125,000,000 and gradually increased to three times this amount at from three to five-day intervals until four doses were given, meantime keeping her confined to bed. The temperature began to come down after the first inoculation and after two weeks remained normal. The pain and swelling in the pelvis also began to subside so that she could walk about the house without much discomfort. Inoculations were continued at weekly intervals giving three more doses of gonococcus 100,000,000 and staphylococcus 400,000,000 at the patient's home and after that, double this amount at my office until eight more doses were given. By this time the pain in the pelvis had entirely disappeared, but some leucorrhea still continued especially during the menstrual period. The same vaccine was continued at two, three and later at four-week intervals until six doses were given. From clinical appearances she has entirely recovered.

Dr. A. T. Slotts (*Illinois Medical Journal*, July, 1911, p. 6) reports the following case: "A young woman gave a history of no pelvic symptoms until about one year after her marriage, at which time a slight vaginal discharge and some tenderness was noticed. Six months after these symptoms first appeared she passed through a normal confinement and puerperium. On the fourteenth day she had

a chill and went to bed complaining of considerable discomfort in the pelvis. Two days later I found the cul-de-sac filled with fluid and the posterior vaginal wall bulging. A history of chronic gonorrhea in the husband, together with the information that the baby's eyes had been sore after birth, caused me to suspect gonorrheal infection. A culture from the vaginal and cervical secretions did not corroborate my suspicions. However, I did not give up the opinion that this was a gonococcus infection, and administered a fresh stock vaccine of this germ every fourth day. Her temperature reached normal on the thirteenth day after beginning treatment, the bulging cul-de-sac subsided and her recovery was rapid and complete. In all, five doses were given. One year has elapsed since her recovery, and she states that she has had excellent health and has no vaginal discharge or pelvic symptoms of any kind."

Much work has been done by some investigators in the treatment of gonorrheal infections, particularly vulvitis and vaginitis in little girls, and some very encouraging results have been secured. In fact, this has become the standard method of treating such conditions. A point here should be emphasized. In the treatment of gonococcic infections in women, cognizance should be taken of the fact that almost invariably the ducts of Skene, or Skene's glands as they are sometimes called, are foci of infection that are usually overlooked but almost invariably present. Spe-

cial stress must be laid upon the importance of opening up these ducts in order that the pent up pus may be let out.

Where intense inflammatory conditions develop associated with excessive fever and other constitutional symptoms indicating toxemia it is almost certain that a streptococcus or colon bacillus infection has taken place and corresponding vaccines should then be employed.

I have used vaccines in quite a variety of pelvic infections with and without gonorrheal complications with such uniform beneficial results that I now consider it almost negligence to allow these cases to go on without giving them the benefit of this treatment.



CHAPTER XX.

Urinary Infections, Acute and Chronic.

NONSPECIFIC INFECTIONS of the urinary tract furnish a good field for vaccine treatment. Here the colon bacillus is the most frequent pathogenic organism found. Staphylococci, streptococci, diplococci, Friedlander bacilli, and pneumococci are also occasionally found. An interesting feature of these cases is that we often find germs in the urine when from a chemical standpoint the urine is normal. In cases of nephritis with albumen, we have never failed to find some pathogenic organisms in the urine. In cystitis and pyelo-nephritis the colon bacilli are usually found in large numbers and it is frequently surprising with what promptness both acute and chronic bladder troubles respond to this method. In some of these cases staphylococci and other organisms are also found with the colon bacillus. Bacterial examinations of the urine should be made to determine what organism is present.

The best way to procure the urine free from outside contamination is to use a catheter and have it pass directly into a previously sterilized vial provided with a sterile cork, care being taken that the catheter is sterile and the parts thoroughly cleansed before catheterizing. The urine should

then be centrifuged and cultures and slides made from the precipitate. Such bacterial examinations of the urine are very important because they often reveal troubles where a chemical analysis may give entirely negative results, and in cases of albuminuria it may often give a clue to the cause of the nephritis. Obscure diseases are sometimes unravelled in this way and, eventually, cured.

It may be well to mention a few such that have come under my observation:

A young man with previous good health complained of not feeling well. He had been losing in weight gradually and tired easily. He had no local pain and no urinary symptoms, slept and ate well but did not seem to relish his food as formerly. Chemical analysis of the urine showed nothing abnormal. Bacterial examination revealed staphylococci. Six doses of staphylococcus aureus and albus stock vaccine, starting with 300,000,000 completely restored his health.

A lady of middle age complained of pain in her knees and back, and general lassitude, want of vigor, and depression. This condition had lasted almost constantly for three years. The pain in her knees was considered rheumatic but otherwise there was no physical evidence of ill health. She had been treated by several doctors and had taken treatment and baths in a sanitarium. She informed me that examinations of the urine had been made and it was found normal. I procured some

urine and found no albumen, casts or sugar but, strangely enough, a bacterial examination showed pneumococci and colon bacilli. A stock vaccine consisting of colon bacilli, pneumococci and streptococci was given once a week. The streptococci were included for the rheumatic condition of the knees. She began to improve after the fourth inoculation and after fifteen inoculations was restored to her former health with the exception of some pain in her knees which was also relieved by continuing the treatment for six months. She is so pleased with the results of this treatment that she wishes to continue it for some time fearing that her trouble might return and consequently is receiving from one to two inoculations a month.

A lady of previous good health consulted me concerning frequent urination during the night. She would sleep a short time then awaken with a pain in the head and a desire to void her urine. This would happen from eight to twelve times during the night. During the day she was not troubled so much. There was no evidence of urinary calculi; the urine was normal in quantity during the twenty-four hours, and a chemical examination showed nothing abnormal and there was little sediment. A bacterial examination revealed colon bacilli.

A stock vaccine was given at first but she was very sensitive to the vaccine and it produced considerable local irritation. An autogenous vaccine was made from organisms isolated from her urine

and treatment was started with this vaccine. 20,000,000 of dead organisms were given the first dose. Quite a local irritation was produced and the dose was not repeated for two weeks. Inoculations were then continued for eight weeks, the dose being gradually increased to 80,000,000 at which time her trouble had entirely ceased. About eight months later she noticed a return of the symptoms and I began to inoculate her again with the same vaccine. She still showed a low resistance to the colon bacilli as evidenced by the amount of inflammation produced where the inoculation was made. Inoculations were continued for four months and gradually increased but the desire to urinate at night has not been entirely relieved. The urine has become sterile no growth developing in the last examination.

I have used autogenous and stock vaccines in advanced cases of nephritis where there was much dropsy and constitutional disturbance. Of these only one showed permanent improvement. This was a case of eight months' standing in a woman of sixty. Six months of this time she had received treatment from competent regular physicians and two months of hydropathic treatment at a sanitarium consisting of sweats and baths, being restricted at the same time to an absolute vegetarian diet. She steadily grew worse and was sent home as a hopeless case. When I first saw her she was very dropsical the whole body being swollen and only one-half pint of urine was passed in twenty-

four hours. The first consideration was to relieve the dropsical condition for which pilocarpin was given to procure free perspiration and elaterium to produce copious watery stools. The next day a dose of streptococcus-colon bacillus combination vaccine was given and a sample of urine was procured under aseptic precautions for bacterial analysis. There was not much sediment, but colon bacilli were found in abundance. On boiling and precipitation with nitric acid, urine showed that one-half its volume was albumin. Her improvement after the first dose of vaccine was so marked that it was continued at five-day intervals for six weeks when she was feeling quite well, passing a normal amount of urine and the dropsical condition was almost entirely gone. The urine, however, still showed small amounts of albumen so the treatment was continued at longer and shorter intervals with large and small doses for over a year but it never entirely cleared up. It is over three years since treatment was started and from all appearances she is in perfect health, there being not a trace of the dropsical condition left but there is still a small amount of albumin found in the urine. Inoculations are still resorted to from one to two months apart, principally to keep track of the case and to keep up her immunizing powers with the hope of an ultimate recovery.

The other five cases all made some improvement after using the vaccines but lapsed back again and finally died.

Three cases of acute nephritis were treated with vaccine. Two were adults in comatose condition from uremic poisoning when treatment was started, stock vaccines were used while autogenous vaccines were being prepared and active elimination by sweats and cathartics was instituted. Both cases terminated fatally within ten days.

The third case was a child three years old. The child took sick running a high fever with throat involvement. I suspected scarlet fever developing but at no time found the slightest rash. The urine became bloody with much albumin. On account of the difficulty of procuring the urine under aseptic precautions no bacterial examination was made. Stock streptococcus vaccine combined with colon bacillus was given at three-day intervals. The fever subsided after the first inoculation but while the bloody condition of the urine disappeared, albumin was present for about ten days. The child made a complete recovery. If there was any scarlet fever element in this it was not apparent.

On the use of vaccines in acute nephritis Allen says: (Vaccine Therapy, Third Edition, p. 147.) "In acute nephritis, and especially in the pyelitis of pregnancy, recourse should be taken to vaccine treatment when colon bacilli are present. It is, of course, well known that a bacteriuria tends speedily to clear up after evacuation of the pregnant uterus; but when acute symptoms appear in the third or fourth month, it is better not to await

delivery, but to employ a vaccine—a method of treatment which has yielded most successful results at the hands of some.”

In cases where there is no evidence of kidney or bladder trouble the question arises, where do these germs come from? Do the kidneys eliminate germs from infections in some other part of the body or are they lingering and developed in the urinary tract. Dodge (*Journal Michigan State Medical Society*, Feb., 1910) claims that the kidneys eliminate germs from infections in distant parts of the body, and he has used vaccines in these cases with good results.

In obscure ailments a bacterial examination of the urine should always be made, for in this way troubles may be found and successfully treated that otherwise could not be brought under control.



CHAPTER XXI.

The Vaccine Treatment in Acute Gonorrhea.

GONOCOCCUS VACCINE is being much more commonly used in treating gonorrheal infections, showing an evident increasing confidence in its therapeutic value. There still exist, however, quite a variety of opinions, many being very enthusiastic about the results that are being obtained, while others think that no material benefit is derived. This is not to be wondered at when we consider that there are still physicians who consider diphtheria antitoxin either useless or dangerous in treating diphtheria.

The estimation of the value of gonococcus vaccine depends largely on the viewpoint of the individual user and the kind of cases in which the vaccine was used. If we expect to cure acute gonorrhea or old acute cases, in which other accompanying infections are ignored, with a few inoculations of gonococcus vaccine, disappointment must be expected.

When a gonorrheal infection exists the problem of immunity at once becomes an important factor in successfully treating the case. Gonorrhea is essentially a surface infection with a tendency to extend to deep-seated structures. The value of a vaccine consists in its specific influence

in increasing the phagocytic power of the blood, thus hastening the establishment of an immunity, and naturally it will act more promptly where the infection is of such a nature that the blood comes thoroughly in contact with the germs. It is for this reason that acute gonorrhea, deep-seated infections, orchitis, epididymitis, swollen lymphatic glands, etc., respond much more rapidly than the superficial infections. In these cases marked improvement is usually found in twenty-four hours after the first inoculation, and in three or four days the pain and swelling will be well under control.

The following case reported by Jamison (*Therapeutic Gazette*, May, 1910, p. 313), illustrates this point very well:

"Mexican, aged twenty-three, married, clerk, came to me on October 4, 1909, complaining of swelling of the left epididymis and testicle. He had contracted a gonorrhea in 1906, which lasted for two months. It again appeared four or five months afterward, but only lasted a short time. Since then he has had a slight discharge from time to time. Examination showed the left testicle and epididymis to be swollen to the size of a small orange, tender, and very painful. The pain and tenderness extended up the cord as far as the internal ring. Temperature 102 degrees.

"Having no vaccine at hand, I painted the scrotum with guaiacol, supported the testicle, and ordered a purge and rest in bed. Two days later

he came back saying that the pain was not relieved and that the swelling was increased. I gave him 15,000,000 of vaccine. On the 8th the pain was less, the temperature normal, and he felt better generally. Injected 25,000,000. On the 10th he received 50,000,000. Two days later he reported that the pain was entirely gone and the swelling was reduced by one-half. 50,000,000 more were given, and on the 18th, when I saw him again, the testicle was normal, there was no induration of the epididymis, nor tenderness on handling. There was no discharge from the meatus. The first urine was clear and contained one small mucoid thread; the second was entirely clear.

“The striking points of this case are: (1) Absence of pain at the site of injection. (2) Rapid diminution and disappearance of the pain in epididymis, testicle and cord. (3) Rapid resolution. (4) Rapid fall in temperature.

“Pain at the site of injection I have found in every case in which the dose was too large, and, moreover, it seemed to be in direct ratio to the toxicity of the dose. In other words, the more pronounced the negative phase, the greater the pain at the site of injection. If the dose is too large it is sometimes followed by increase of pain in the affected part and elevation of temperature. Excessive intoxication may cause a fall in temperature, and a rise may follow the immunizing process.”

Many physicians who, on attempting the treatment of subacute and chronic gonorrhoea, fail to secure immediate and lasting results, should not misjudge this method of treatment. It is far from infallible as may be seen from the reports which follow; but, fortunately, the results at times are of a sufficiently startling nature to convince the most critical observer.

B. Wallis Hamilton (*Journal A. M. A.*, April 9, 1910, p. 1198), after an extensive use of *stark* vaccines in vulvovaginitis in children, concludes that: "Vaccine therapy has a place in the treatment of this infection in little children, for the following reasons:

1. The short time required for a cure is over 85 per cent. of cases.
2. The ease of administration of the vaccine, no special apparatus or knowledge of technique being necessary.
3. The vaccine is apparently harmless when used under aseptic precautions.
4. It is not necessary to take the opsonin index, with its complicated technique.
5. It eliminates irrigations, which draw child's attention to its genitals, at times even inducing precocious masturbation. The douches necessary in the irrigation treatment, with the best of care and gentleness, produce injury when continued over a long period.

Dr. Courtney W. Shropshire (*South Carolina Journal*, May, 1911) reports 500 cases

rheal infections treated with gonococcus vaccine and gives the following tabulated results:

	No. Cases	Cured	Fail.
Acute Gonorrhea	111	100	11
Acute Gon. Prostatitis	8	8	0
Acute Gon. Prost. and Orch., Single.....	7	5	2
Acute Gon. Prost. and Orch., Double....	2	2	0
Acute Gon. Periurethral Abscess.....	3	2	0
	<hr/> 131	<hr/> 117	<hr/> 14
Chron. Gon. Prostatitis.....	263	250	13
Chron. Gon. Pros. and Orch., Single.....	20	17	3
Chr. Gon. Pros. and Orch., Double.....	15	15	0
Chron. Gon. Prost. and Vesiculitis.....	25	24	1
Gon. Per., Scrotal and Pros. Abscess....	11	11	0
Gonorrheal Rheumatism	30	28	2
Gonococcemia	5	5	0
	<hr/> 369	<hr/> 350	<hr/> 19
	<hr/> 500	<hr/> 467	<hr/> 33

Concerning the vaccine treatment of acute gonorrhea Shropshire has this to say:

“It has been my experience that the injections repeated every third or fifth day prove very efficacious in the treatment of acute gonorrheal infections, with or without complications. The oft repeated injections are continued, as a rule, until the abatement of the more acute symptoms. It is rare that any acute gonorrheal conditions will call for more than six or eight injections, as mentioned before, every third or fifth day. I generally start with about 7,500,000 gonococcic vaccine, then the

next injection is 15,000,000, then the third injection of 25,000,000. Then I give 40,000,000 and 50,000,000 if I find it is necessary. I have found that in the cases in which I failed that perhaps my initial injection, or dose, was too large and raised the patient's opsonic index too high, which necessarily increased and aggravated the symptoms, increasing the flow of discharge and increasing the pain. In several of the above cases I could not give the vaccine at all, as it made the patient considerably worse."

Dr. Walter A. Griffin (*Congress of American Physicians and Surgeons*, Vol. VIII, p. 155) says: "Possibly the most conclusive demonstration of its utility has been adduced by Hamilton, who reports the results obtained in 344 patients observed in the Vanderbilt Clinic, and states that in 260 treated by irrigation with various antiseptic solutions, sixty per cent. of cures resulted after an average duration of 10.1 months of treatment, while ninety percent. of the eighty patients treated by vaccines were cured after an average treatment of 1.7 months. Even in this, the most favorable series thus far reported, vaccine therapy did not give universally good results, as a certain proportion of cases failed to receive any benefit from it. Contrary to the general experience in other infections, it appears that in this condition almost as satisfactory results may be obtained by the employment of stock vaccines as by those prepared

from organisms cultivated directly from the patient. On the other hand, one should bear in mind the possibility that in some of these cases in which no reaction occurred the vaccine employed was inert."

The character of the discharge varies greatly after using the vaccine in these acute cases. In some cases it will become very much less, one or two days after the first inoculation and, by continuing the treatment, the patient will go on to recovery. In others no material improvement is noticed as far as the amount of discharge is concerned but it becomes more watery in character. The pain on urination and the burning sensation is almost invariably relieved, and deep-seated infections are avoided, at least that has been my experience in treating these acute cases with vaccines. Usually the infection will not become entirely eradicated, because the germs will continue to develop on the surface where phagocytosis cannot take place. For this reason local treatment should be employed in conjunction with the use of the vaccine to take care of the surface infection. The most opportune time to begin local treatment is when the immunizing activity has developed enough so the pain is relieved during urination.

In active gonorrhea the question of mixed infections must also be taken into consideration. While in the early stage of the infection the gonococcus is usually found in pure culture, yet in many cases staphylococci will also be found before

the acute stage has subsided and in subacute or chronic cases they are practically always present. Bearing this in mind I have considered the advisability of immunizing the patient against staphylococcus infection before it takes place by giving a mixed gonococcus and staphylococcus vaccine early in these cases. From the experience I have had with this method during the past year it appears to be of advantage. Treatment should be started with from 10,000,000 to 25,000,000 gonococci combined with 50,000,000 to 100,000,000 staphylococci making inoculations from three to five days apart. When using the gonococcus vaccine it is advisable to observe the amount of local irritation produced where the inoculation was made. Some cases are very sensitive to this vaccine and injections sometimes result in considerable swelling. Such local irritation should always be used as an indication not to increase the next dose. After a few doses are given, an increased immunity results and larger doses may be used without local disturbance. The dose of this combined vaccine may be gradually increased to 100,000,000 or 200,000,000 gonococcus and 400,000,000 or 800,000,000 staphylococcus if necessary. When the larger doses are given it is advisable to make inoculations at from three to five-day intervals. If the case progresses favorably this dosage may be continued, otherwise it should be increased to 50,000,000 or 100,000,000 and in some cases even more.

To emphasize my own contentions I will quote an interesting case report from an article by Joseph J. Boehm (*Therapeutic Gazette*, Jan. 15, 1912, p. 21) on the use of a mixed gonococcus-staphylococcus vaccine in treating gonorrheal infections. He says: "All cases of prostatic gonorrhea, and gonorrheal arthritis, as well as epididymitis and orchitis, should receive the benefit of the combined vaccine. In February, 1911, the following case of interest was successfully treated with vaccine, and is a type of similar cases treated by me:

Mrs. Z., aged thirty, married. Three days after coitus her husband brought her to me for examination. He had been treated one week previously by me for urethral gonorrhea, contracted extramaritally. Examination of his wife showed a thick urethral and vaginal purulent discharge with gonococci abundant in the urethra. One day afterward both her knee joints were tender; the left joint especially was so painful and swollen that she could not stand on the limb. I sent her to the hospital immediately. She showed signs of systemic gonorrhea within twenty-four hours after I had first seen her. There was a loud systolic murmur at the apex of the heart, the pulse was rapid, temperature 102 deg. F., face flushed and anxious looking, and the patient in great distress. The limb was immobilized on a splint, and local applications made as placebos. Cultures of the blood showed the gonococcus present in the cir-

cultation. The temperature in the first week went to 104 deg. The patient was very sick, and on account of her endocarditis a probable fatal prognosis was given. She was placed from the beginning of her arthritis on mixed vaccine, given at intervals of three days. She received twelve injections, and at the end of that time her temperature dropped to normal and all signs of her systemic infection disappeared, except her cachexia, which followed her high temperature. The left knee-joint was swollen for three weeks, but as the fluctuation in it progressively diminished the joint was not aspirated. She was kept in the hospital for four weeks, and was then taken charge of by an orthopedic surgeon, who kept her in a plaster cast for several weeks. Outside of some ankylosis of her knee-joint she made an uneventful recovery."

Here again is a case of a malignant systemic infection responding to combined vaccine.



CHAPTER XXII.

The Chronic Gonorrheas.

WHEN GONOCOCCUS VACCINE first came into use many physicians tried it first on old chronic cases and if they did not get results at once, immediately concluded that bacterial vaccines were of no use, never realizing that these cases were nearly always mixed infections. To this day there are physicians who are denying themselves the fruits of vaccine therapy simply because a limited experience was unsuccessful. To give gonococcus vaccine alone in such cases and not take care of the other infecting organisms is palpably of little avail.

The principal and most constant accompanying organism in chronic gonorrhea is the staphylococcus albus. Pneumococci, streptococci, Friedlander bacilli, and the micrococcus catarrhalis may also be found in some cases. A small Gram-negative bacillus is quite frequently found, and whether this organism is pathogenic in character or not, has not as yet been determined. Colon bacilli have also been found in these cases. As the staphylococcus is the most constant complicating pathogenic organism found in chronic gonorrhea, a practical method is to use staphylococcus-gonococcus combination as a routine in these cases, but

where a case does not promptly improve a careful bacterial examination should be made to determine if other organisms are present. By this method a very large majority of these cases can be successfully treated where facilities for making bacterial examinations are not at hand.

In making the bacterial examinations it is necessary to procure culture growths, the microscopical examination of slides from smears alone being unsatisfactory.

Where a urethral discharge exists ascitic-agar slants should be inoculated by spreading some of the discharge carefully over the agar slant under aseptic precautions. The best instrument for this purpose is a platinum loop. A small sterile swab or probe will also answer the purpose. The specimen should always be spread thinly over the agar otherwise there will be too much growth, the rapidly growing organisms over-growing and obscuring the others. This is especially the case during the hot summer months when the specimen must be sent long distances. Where a suitable culture can not be procured from the urethral discharge a bacterial examination of the urine should be made. For this purpose the urine should be voided direct into a vial previously sterilized by boiling and provided with a sterile cork. Ascitic agar tubes should be inoculated with shreds fished out of the urine with a sterile pipet. Where no shreds can be picked up, the urine is centrifuged under aseptic precautions, and the sediment inocu-

lated on agar slants. After incubation from twelve to twenty-four hours inoculations should be made from the various colonies and incubated, and the organisms examined microscopically.

These cases should then be treated with vaccines corresponding to the organisms found, but in most such cases autogenous vaccines should be prepared, especially where unusual organisms are found.

PROSTATIC INFECTIONS.

Robertson (*Journal A. M. A.*, Sept. 4, 1909, p. 797) is of the opinion that, in prostatic infections after gonorrhea, the staphylococcus albus is the real pathogenic organism, coming in as a secondary infection after the gonococcus has paved the way. The results obtained in his reported cases treated with staphylococcus albus vaccine certainly show that his contentions are well grounded. He gives staphylococcus albus vaccine in 400,000,000 doses every other day for three successive inoculations, and thereafter once a week until the case is cured. Generally recognized local treatment is also employed at the same time.

Unquestionably good results are being obtained with the gonococcus-staphylococcus vaccine in obstinate cases of chronic gonorrhea. Cases that have resisted all other treatment for years are being cured by this method.

In treating these cases the necessity of taking care of the surface infection with the usual local

treatment, should be borne in mind, since the vaccine is used to get rid of the germs located deeper in the tissues, which the local treatment does not reach.

The dose will vary from 25 to 100 millions gonococcus, combined with 100 to 400 millions of the staphylococcus albus vaccine, repeated at intervals of three to seven days.

In chronic cases, treatment must often be continued for two months or more, and the dose gradually increased until the case is under control. I have given as high as 400,000,000 gonococci and 1,600,000,000 staphylococci to a dose, repeated at one-week intervals. When these large doses are given, it is preferable to make inoculations at two or three different points. In this way excessive local irritation at any one point is avoided.

Another important point which if overlooked militates against the successful treatment of chronic prostatic infections. The pus-accumulations, so common here, must be removed manually. Careful prostatic massage is as essential as the removal of pus in other infections.

GONORRHEAL RHEUMATISM.

Gonococcus vaccine is now regarded as the most efficient remedy in the treatment of gonorrheal rheumatism. In discussing this subject B. A. Thomas (*Journal A. M. A.*, January 22, 1910, p. 2548) says: "I, myself, have observed almost incredible results in gonorrheal arthritis treated by

bacterial vaccines. Moreover, the vaccines in acute conditions, in my opinion, have a superiority in usefulness over serum as a therapeutic measure."

In these cases it is not always an easy matter to determine whether we have a case of gonorrheal or ordinary rheumatism to deal with. If a man has rheumatism who has had gonorrhea, it does not necessarily follow that that is gonorrheal rheumatism.

When the diagnosis is doubtful, the vaccine treatment will often aid in clearing the matter up. If no improvement is noticed after a few inoculations of gonococcus vaccine, the case is not liable to be gonorrheal. If the case clears up the diagnosis is clear.

Frequently a gonorrheal rheumatism is associated with subacute or chronic gonorrhea, and the question of treating the gonorrhea with the rheumatic condition naturally arises. As the staphylococcus is the usual accompanying organism in the urethral infection it is entirely feasible to use a mixed gonococcus-staphylococcus vaccine in gonorrheal rheumatism. The permanence of the successful treatment of gonorrheal rheumatism depends largely upon the associated cure of the gonorrhea as well. As long as points of gonorrheal infection exist in the urinary tract there is always a danger of a new systemic infection taking place with the result that the rheumatic condition will relapse.

By giving the combined vaccine, the gonorrhea is more readily controlled with a beneficial co-ordinate effect on the rheumatic conditions. Where complicating infections are determined by bacterial examination, corresponding vaccines should be given. It is advisable to start treatment with 25,000,000 gonococcus combined with staphylococcus 100,000,000 and gradually increase to gonococcus 200,000,000 and staphylococcus 800,000,000. Inoculations should be made at intervals from four to seven days. In stubborn cases the dose may be increased to even double the above amount.



CHAPTER XXIII.

The Use of Typhoid Vaccine.

IN PROPHYLAXIS.

THE PROPHYLACTIC VALUE of typhoid immunization is no longer questioned. The results obtained in the medical service of the English troops in India from 1906 to 1910 inclusive, show not only a very marked decrease in the number of cases contracting the disease but a still greater decrease in the death rate. Similar results were obtained by typhoid immunization of the German army in West South Africa from 1904 to 1907. The results obtained in our own army during the past year gives the best and latest illustration of typhoid immunization on a large body of men.

Dr. James M. Phalen (*Journal A. M. A.*, Jan. 6, 1912, p. 9) sums up the results thus: "No where, however, do we get such convincing evidence for the practice of typhoid immunization as from the records of our own army. Up to the present time over 60,000 men have completed the inoculation, and among this entire number, and covering a period of nearly three years, but twelve cases of typhoid have developed and no death occurred. One man at the Guantanamo Naval Station died

Charles Russ Harvey

five days after the first inoculation from a case of walking typhoid. This is the only fatal case of typhoid in the government service in any one on whom the inoculation had been begun. The record of the Maneuver Division in camp at San Antonio, Texas, during the past summer has been most instructive. An army division having an average strength of 12,800 men, all inoculated, occupied the same camp for four months, from March to July, and in this command but one case of typhoid developed. This was a mild case in a hospital corps man who had not completed the inoculations necessary for protection. Lieut.-Col. J. R. Kean, who has recently reported on this camp, is authority for the report of forty-nine cases of typhoid with nineteen deaths for the city of San Antonio for the same four months. During the same period that this camp existed at San Antonio, between three and four thousand men were in camp at Galveston, Texas, and in this command no case of typhoid occurred, while the city of Galveston furnished 192 cases of the disease during the existence of the camp. The city and the camp had the same water, milk and food supply, the only difference being that the camp had been protected by inoculation.

"About 3,000 men were scattered along the Mexican border mostly in small camps, many of them in localities where typhoid was present, yet of this command only one man contracted typhoid, which ended in recovery. Contrast the record of

these camps with those of the concentration camps of the Spanish-American war and consider the intimate contact of these camps with typhoid-infected cities. It is inconceivable that, with such conditions, the practical abolition of typhoid could have been effected without the use of immunizing inoculations."

The question that naturally arises is: Why, with such a powerful weapon at our command as shown by this army record, should any typhoid fever be allowed to remain in any part of the country. To eradicate an epidemic disease, which is scattered all over the country certainly looks like a tremendous proposition, but there is no good reason why it can not be done. The typhoid bacillus under ordinary conditions does not retain its vitality for a long time. When dried it dies within a week and in water or soil it will not live over a few months. In human feces it has been known to remain alive for five or six months during winter but not so long during the summer months. From this it is quite clear that the disease is essentially propagated by passing through man, each additional case creating a new focus for spreading the infection. Typhoid carriers, of course, are a perpetual menace, but with modern methods of tracing the disease these cases will be found and either cured with vaccine inoculations, or segregated so that they can do no harm.

Infected water supplies of cities and towns have been a very prolific source of spreading ty-

phoid fever, but with modern engineering methods and a more careful disposition of sewage, much of this source of the fever has been avoided. From more recent observations it appears that a large percentage of our typhoid cases have their origin from dairy and other food products handled or procured at places where typhoid fever exists. The practicability and far reaching importance of typhoid immunization under such circumstances is at once apparent. All the members of a family and those associated with a household should be immunized at once where there is a case of typhoid fever. This would limit the disease to one single case and instead of having a focus for spreading infection for four or five months as is often the case where successive cases come down with the disease, it would be limited to that many weeks. In cases where milk or food products have been supplied from places where typhoid exists a complete list of the customers should be obtained and all such cases immunized. By following up this method the disease would soon be limited to but few cases when tracing up and immunizing those having been exposed would become a comparatively easy matter.

The procedure is harmless and usually causes little or no disturbance. Russell (**Bulletin of the Johns Hopkins Hospital**, March 1910) sums up his conclusions regarding typhoid prophylaxis as follows:

1. Vaccination against typhoid undoubtedly

be eliminated. I confidently believe that when the results obtained in the army service are once generally understood the people will demand such protection in their own interest. The most important need is initiative—on the part of the family physician.

In the chapter on meningitis and meningococcus vaccine a precautionary suggestion is made which is equally applicable to typhoid prophylaxis. (See Chapter XXXIV on page 213.) Virtually it amounts to this: Do not start the immunizing process with as large a dose in an individual suspected of being in the incubation stage of the disease. In such cases spread the process over a longer period, giving four or even five doses starting with, say, 100 or 200 million as the first dose. The reason must be obvious.

IN THERAPEUTICS.

No branch of vaccine therapy has received more attention during the past year than the use of typhoid vaccine in the treatment of typhoid fever and there is an ever-increasing confidence in its therapeutic value as shown by the observations of a number of very competent men.

When vaccine therapy first came into use many were of the opinion that this method of treatment would not be applicable in the treatment of acute general infections, contending that in such cases the many millions of germs in the blood and tissues were adequate to stimulate the immunizing faculty

protects to a very great degree against the disease.

2. It is an indispensable adjunct to other prophylaxis among troops and others exposed to infection.

3. It is very doubtful if there is an increase of susceptibility following inoculation.

4. Vaccination during disease, for therapeutic purposes, fails to reveal any evidence of a negative phase.

5. The statement that vaccination should not be carried out in the presence of an epidemic is not justified by the facts at hand.

6. The procedure is easily carried out, and only exceptionally does it provoke severe general reactions.

7. No untoward results have occurred in this series of 6340 vaccinations.

Typhoid vaccine as a prophylactor is usually given in three doses at ten-day intervals, with an initial dose of 500,000,000 and two successive doses of 1,000,000,000 each.

The question of procuring the co-operation of the public in this effort is very important. From the nature of the case this would appear comparatively easy. Most people have a tremendous dread of typhoid fever and when informed that they are in danger of contracting the disease it requires but little persuasion to procure their consent for immunization, especially if carried out by the health authorities so the element of expense would

be eliminated. I confidently believe that when the results obtained in the army service are once generally understood the people will demand such protection in their own interest. The most important need is initiative—on the part of the family physician.

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and that to add more germs in the form of vaccines was irrational and would have a tendency to aggravate matters by overwhelming the patient and precipitating a negative phase.

The vaccine treatment of typhoid fever, however, gives us an excellent illustration of how unreliable even plausible theories are in the absence of actual demonstration. Here we have a condition where typhoid germs are abundantly present in all parts of the body and why under this condition the injecting of several hundred millions of dead typhoid germs under the skin should accrue to the benefit of the patient may not be so easily explained.

Russell's investigations (**New York State Journal of Medicine**, Dec., 1910, p. 545) in prophylactic vaccination show that agglutinins and opsonins are formed in abundance in from five to eight days after the initial inoculation of typhoid vaccine. In studying the formation of antibodies in typhoid fever it is also found that they make a pronounced appearance about the eighth day of the disease, at least at about that time agglutinins are found in sufficient quantities to respond reliably for a Widal test. There is good reason to believe that the tissues of typhoid fever patients respond to a dose of vaccine, in the production of antibodies, similarly to those of persons who have received it for prophylactic purposes. This would lead to the production of antibodies in addition to those being formed as a consequence of the pro-

gressive infection. In this connection one should also consider that as a consequence of the infection having existed for some time the tissues are in all probability somewhat prepared for the production of antibodies and under the stimulus of the vaccine will respond much more rapidly than following its administration to a healthy individual for prophylactic purposes. Clinical symptoms as shown by various observers indicate that some such condition exists.

It has been repeatedly noticed that within one or two days after the first inoculation the patient begins to feel better and stronger, looks fresher, the mind clears up and that anxious appearance subsides even if the temperature has not materially improved. This would show that the tissues have responded favorably to the vaccine within this short period of time.

A recent case of mine aptly illustrates this action of typhoid vaccine. A boy nine years old had been sick with typhoid fever for six weeks when I saw him. During the fourth and fifth weeks the temperature became normal at times, but a distinct relapse followed and when I first saw him the temperature ranged from 102.5 in the mornings to 104 in the evenings. He was delirious and did not recognize his parents, had an anxious expression, was very much emaciated with a pulse that was rapid and poor in quality. Conditions looked very unfavorable. I gave him a 200,000,000 dose of vaccine and had the ice-bag on the head con-

tinued. No other treatment was employed. For three days after the first inoculation there was no material change in temperature but his mind cleared up, the delirium subsided and the anxious expression left him. At that time a second dose of 250,000,000 was given. One day after this dose the temperature was 100 and a day later, five days after the first inoculation the temperature became normal. On the sixth day a 500,000,000 dose was given. The case continued to improve and made an uneventful recovery.

No negative phase or bad effect has been observed (and recorded) by any one, but on the contrary some apparently hopeless cases are reported in which large doses of vaccine were given with a resulting recovery. The consensus of opinion is that to obtain the best results the vaccine should be used early. Typhoid fever being a disease in which a diagnosis is not readily made from clinical symptoms in the early stages, the question of laboratory tests naturally arises. The Widal test is quite reliable but unfortunately it is not available in the early stages, before agglutinins have been formed. A bacterial examination of the blood appears to be the most reliable method of making an early diagnosis. This method is comparatively simple but it requires laboratory facilities, which are not always at hand for making immediate examinations, especially in small towns or the country. Early treatment being essential to obtain the best results the vaccine may be advantageously

given before verifying the diagnosis by blood examination. The vaccine is entirely harmless and would be followed by no bad results even if some other febrile condition should exist. Widal tests are not reliable after giving typhoid vaccine because the vaccines would result in the production of agglutinins which would respond to that test.

Unfortunately no large series of cases has been reported in which the vaccine was used early in the course of the disease to determine the advantages of this treatment. Most reported cases have been from hospital practice where they are far advanced before being admitted, and usually treatment was not started until the diagnosis was verified by a Widal. Many extremely severe and advanced cases are also included in the mortality rate but even under these unfavorable conditions the death rate has been reduced by about two-thirds and the course of the disease shortened to a little over one-half its usual duration.

I will quote extensively from Dr. James G. Callison (**Medical Record**, June 24, 1911, p. 1127) who, after reviewing the literature on typhoid vaccination and reporting a series of twenty-four cases, says:

“A point deserving considerable emphasis is the other treatment to accompany vaccine therapy. If there is any rationale for vaccine treatment it is in the fact that it is an effort to follow or imitate Nature’s method of bringing about a cure.

All other treatment is admittedly symptomatic. Routine it may be called, but it is routine only in the sense that long experience has proved that certain routine most nearly meets the symptoms as they arise or prevents their development. If a vaccine will abbreviate the natural course of the febrile period, leaving it otherwise the same, then by all means the routine treatment should be continued until the vaccine controls the disease process. This has been the procedure in all these cases. The vaccine and routine treatment have been in different hands, and each has proceeded independently of the other.

“The Value of the Treatment.—The almost universal testimony as to the value of vaccine treatment given by the long list of those who have used it, a testimony the more positive the longer the list of cases treated, must certainly carry weight. To attempt to form an unbiased judgment of its efficacy is, however, more difficult. This much may be said with assurance: I believe that it is as effective or more so than the cold baths and packs. Two things seem fairly certain: It does lessen complications and reduce the number of relapses. Grant these, and the argument for its use ceases. Any treatment that accomplishes these two things must shorten the average duration of cases and reduce the death rate.

“The Rationale of its Use.—This is the most difficult problem to deal with satisfactorily. Why give injections of vaccine to a patient who is suf-

fering from both a localized and a blood infection? There is at present no entirely satisfactory answer to this question. Some suggestions, however, may be made as to the reason. The tissues at the site of the local infection are not the histological elements most active in the production of antibodies, and they are also partly devitalized by the local infection. Then, as Wright says, it is a well known fact that in the production of antibodies subcutaneous inoculations are more efficient than intravenous. By subcutaneous inoculations the bacterial proteids are brought in great concentration into contact with those connective tissues which seem to be most active in the production of antibodies. As in the battle between cell and bacteria these proteids of dead bacteria are incapable of elaborating protective substances, all the tissue-cell energy under the stimulus of their presence is expended in producing antibodies. The blood infection may represent in a way the intravenous injection of a vaccine, while the vaccine treatment itself is a true subcutaneous inoculation of a vaccine. In this manner the patient receives the full benefit of both subcutaneous and intravenous inoculation. The vaccine treatment takes a process of nature which is running riot and accomplishing little, and converts it into an efficient, controlled process.

“May the Vaccine do Harm?—A question of vital importance is: May the vaccine treatment injure the patient? Almost every article on vaccine

treatment emphasizes the danger of a vaccine given in excessive dosage, without making it clear as to what constitutes too large a dose. Too vigorous a treatment in any line certainly would be unwise, but my experience has led me to believe that the danger line is far removed from the rational dosage. Two of my cases in particular bear on this point: Mrs. A. P., Case 17, was exceedingly toxic from metabolic products which the kidneys failed to eliminate, as well as from typhoid toxins, and examination of the urine showed a most alarming condition of the kidneys; yet her improvement was most remarkable under vaccines pushed more vigorously than in any case up to that time. Mrs. M. M. C., Case 23, was making steady progress downward and her case was said to be hopeless. The vaccine treatment was pushed, yet without injury. Her condition was such that the least added burden would have proved fatal, and yet she progressed slowly to a cure.

“The Negative Phase.—These treatment vaccinations seem to throw some light upon another question of great importance; that of the ‘negative phase.’ There is a widespread belief that inoculations where there is liability of infection leads to a lowering of the resistance of an individual, a rise of temperature and an intensification of the clinical symptoms. This syndrome is referred to as the ‘negative phase.’ Both Leishman and Russell conclude that a ‘negative phase,’ if it exists in typhoid, is so slight as to be negligible. Some of

the cases in this series, which were inoculated at a time when the condition was so grave as to be alarming, yet with no aggravation of the clinical symptoms, seem to confirm this conclusion. Certainly, if a patient suffering from the worst form of typhoid infection can receive a treatment inoculation with perfect impunity, then there can be little danger in giving an uninfected individual a prophylactic inoculation in the 'presence' of an exposure. In only a few of my inoculations was there a rise of temperature and in none was there a noteworthy aggravation of the clinical picture. The rise of temperature, when it did occur, seems rather to have been a coincidence except, perhaps, in one case (No. 17), where some raise followed most of the inoculations.

"Conclusions.—1. The production of antibodies or protective substances in response to the inoculation of a vaccine follows definite fixed laws, regardless of whether the vaccine is given for prophylactic or curative purposes, and the results in treatment must be interpreted in the light of what is known of these laws.

"2. Inoculations of vaccine in typhoid fever prevent relapses and lessen complications, and in some cases probably also shorten the original attack.

"3. Stock vaccines should be given in preference to autogenous vaccines in typhoid fever. The older the culture the better.

"4. When given in therapeutic doses stock

vaccines are without injurious effect, and do not interfere with other treatment.

"5. The routine treatment should be continued until the fever process is controlled by the vaccines.

"6. The dosage used by many of those who have treated typhoid with vaccines in the past has been too small to secure the best possible results.

"7. Every case of typhoid fever should receive vaccine treatment as soon as a diagnosis is made, and this should be continued until the temperature becomes normal or it is demonstrated that the case will not respond to this form of therapy."

A few more excerpts from current medical literature may not be amiss as this subject is far too important to be discounted by any feeling, however slight, that what I may have to say is tinged with ultra-euthusiasm—that I am "vaccine mad."

On the treatment of typhoid fever with vaccine Dr. James M. Phalen (*Journal A. M. A.*, Jan. 6, 1912, p. 11) says in part:

"Inoculation shortens the fever period and the total duration of the disease; it reduces complications and relapses markedly; the mortality of all cases that I have been able to find reported is 4.9 per cent. A distinct crisis following the second inoculation is . . . by Meakins and Foster of Mont . . . in 50 per . . . of their

cases. It is interesting that these men gave the largest dosage of the vaccine—from 1 billion to 2 billion bacilli. Very pronounced amelioration of headache, gastro-intestinal symptoms and toxemia is usual. It has apparently been directly life-saving in a few all but hopeless cases, though ordinarily it has little effect on such. All agree, however, that even in the cases in which it causes no improvement, it has done no harm. The negative phase of Wright, which did so much to retard progress in typhoid immunization, is non-existent except in the most excessive dosage of the vaccine. In few cases reported was there any increase of temperature following the treatment, and in none was there any aggravation of the disease. The dosage employed in the earlier cases usually ran from 10 to 100 million. With increasing confidence the dosage has been increasing, until at the present time it is usually from 100 to 500 million. It is probable that those who have reported negative or discouraging results have been using the vaccine in too small dosage and that, with increasing dosage, even better results than thus far reported will be obtained."

Dr. W. H. Watters (*New England Medical Gazette*, Sept. 1910, p. 411) sums up his results as follows:

"At our laboratories in Boston and at our hospital we began several years ago the first routine test of the treatment that was ever employed, at

least to our present knowledge. In a recapitulation of the results made for the annual report we have compared our figures with those of patients in the same institution at the same time with like care and attention, but without vaccines. The figures are as follows:

	Treated 86 Cases	Untreated 70 Cases
Average duration of fever (days).....	16	25
Average residence in hospital (days)....	39	56
Percentage of recrudescences.....	9	24

“No patient has been injured in any clinical manner, and if further statistics of later years are equally satisfactory but one conclusion is inevitable.”

Under the caption “Antityphoid Inoculation in General Practice,” a splendid editorial more than a year ago appeared in (**American Journal Physiological Therapeutics**, January, 1911, pp. 256-258) and which could not be more tritely put today with a far greater fund of information at hand. It is worthy of repetition here:

“For more than seventeen years the matter of the use of bacterial products in the treatment of typhoid fever has been under discussion. Since Fraenkel’s first article in 1883 hundreds of articles and reports have appeared, and today the fact stands out in bold relief that in the biologic preparations of the bacillus typhosus, and more especially the typhoid vaccine, we have a therapeutic agent of unquestionable merit.


“Since typhoid is an epidemic disease and such a common scourge during war, much of the investigative effort has been accomplished under the supervision of several governments and health bureaus. The immense amount of statistics which have resulted ought surely to be enough to convince the most confirmed skeptic.

“To put the facts as briefly as possible prophylactic inoculations of typhoid vaccine have made a noticeable difference in both the incidence of the disease and its mortality. Not only may typhoid inoculations be used as a prophylactic measure, but also in the actual treatment of the disease. Manifestly there has been no opportunity to collect the thousands upon thousands of reports that are to be found in the literature on the prophylactic use of this remedy; but results in hundreds of cases should serve at least to stimulate an interest among the rank and file of the profession in the most sensible remedial agent we have in the treatment of typhoid infections.

“On this subject Allen writes as follows: ‘I will say, however, in the light of my experience, that were I now entering upon another three months service I would unhesitatingly give every case the benefit of the opsonic treatment at once, administering no other remedy until it was demonstrated that the case did not respond. As I watched the progress of these cases I found myself relying more and more upon this new method. It

was a very unique and interesting phenomenon to me to see repeatedly apparently serious cases of typhoid fever, presenting all the usual symptoms, rapidly overcome them and in a few days change the whole complexion of their illness for the better, going on to rapid convalescence. After but one treatment some of them began immediately to improve in every respect. The fever became less, the headache and backache disappeared, the tongue cleared up and they began to complain of hunger. Most of them would say, if asked, that they felt better and that, also, very soon after the initial treatment. About 75 per cent of all the cases were favorably influenced.

“Only one other point requires mentioning, and that is the influence of typhoid inoculations upon “typhoid carriers.” Many an individual is a walking menace to the community, and anything that might be used to relieve them from this chronic infection and at the same time preclude the possibility of continually reinfesting their associates, would, without a doubt, be a Godsend. The amount of work done along this line is decidedly limited. Typhoid carriers, fortunately, are not very common, or, unfortunately, not so easily detected; but one or two cases worked out and reported ought to be sufficient to base statements upon. Houston, writing in the **British Medical Journal**, reports his observations on three cases, one of which is both interesting and encouraging. He gave the patient



doses of 50,000,000, 100,000,000, 200,000,000, 300,000,000, 500,000,000 and 1,000,000,000 bacilli, progressively increasing at intervals of three weeks. During this time the weight returned to normal and the health, which had not been good since the attack of typhoid fever, two years before, was completely restored. At the same time the typhoid bacilli disappeared from the stools and from the urine.

"To sum up, the typhoid vaccine is a potent prophylactor and therapeutic agent. The only reason, as we see it, that it is not more universally used is that the majority do not know of its virtue; it therefore becomes our duty to disseminate information which we believe carries with it immense possibilities for individual and communal good."

The question of mixed infections occurring during typhoid fever is also of importance. Pneumonia is not uncommon and is always a serious complicating factor when it occurs. Staphylococci, pneumococci and streptococci are so frequently found in the respiratory tract that infections by these organisms may take place. The streptococcus is particularly known to be a secondary invader where other diseased conditions have reduced the vital powers. Jordan (General Bacteriology, p. 173) says:

"In addition to their conspicuous role as initiators of very diverse pathologic conditions, streptococci are present in 'mixed infections' and 'sec-

ondary infections' more often than any other microbes; that is to say, they have a tendency to follow in the wake of and act as accomplices to other pathologic organisms. It has been found from an examination of the heart's blood of cadavers that in about one-third of all fatal diseases streptococci invade the blood before death, and in these cases they perhaps aid more or less in facilitating a fatal termination."

In my experience prior to the use of vaccines two severe cases of typhoid fever were met in which extensive furunculosis developed during a slow convalescence. This evidently was due to a staphylococcus infection. A suitable vaccine would have been most helpful.

Typhoid fever is a disease where inflammatory lesions are present in the intestines and infections with the colon bacillus as well as coccus infections may also be looked for from this source. It is quite probable that in many cases where no marked beneficial results were obtained with typhoid vaccine, some other infecting organisms were responsible, in which corresponding vaccines might have been used to advantage.

The results obtained by Dr. J. H. Mudgett (**Medical Council**, Jan., 1912, p. 8) in one of his cases where a mixed streptococcus-staphylococcus-colon bacillus vaccine was used indicate that this method of treatment was of advantage. The temperature dropped from 104 to 100 in three days

when it went up again and after a second inoculation it became normal and remained there.

From the known beneficial influence of vaccines generally there is good reason to believe that mixed vaccines will be of great advantage in treating cases of typhoid fever where side infections take place.



CHAPTER XXIV.

Appendicitis.

THE VERMIFORM APPENDIX seems to be a favored organ for infections, probably because of its peculiar construction and the fact that it is a rudimentary organ. Infections of this organ must always be considered as more or less serious because the close proximity to the peritoneal cavity is so liable to produce a peritonitis. It is impossible to make a bacterial examination to determine the infecting organism, but we have learned that colon bacilli are nearly always present. If streptococci should be present the dangers of an imminent streptococcus peritonitis are apparent. Whether the case is to be operated on or not, to immunize against these organisms, is doubtless an advantage to the patient. In the early, acute stage where there is much pain and tenderness with fever almost invariably have I seen marked improvement within twenty-four hours after the first inoculation of a combination of streptococcus 30,000,000 and colon bacillus 40,000,000. With the intense acute inflammatory process subdued, the condition for operation is better should such a procedure be desired. So far I have treated sixteen cases with the vaccine method and will briefly describe several of them.

Mr. D. was seen on Dec. 25 when he evidenced a well marked appendicular inflammation. Temperature 101, pulse 120. I advised absolute rest in bed, an ice-bag, no food and gave a dose of streptococcus-colon bacillus vaccine. The next day pulse and temperature were about the same and by the 27th the temperature was 99 and pulse 120. Another dose of the same vaccine was given. The pain by this time was practically gone and patient feeling quite comfortable. On the evening of the twenty-seventh the temperature was normal and pulse 114.

Temperature remained normal and pulse came down to 84 by the 30th. The patient feeling comfortable with practically no pain. On the 31st the temperature was 99.5 and pulse 88. The same dose of vaccine was repeated and on the morning of Jan. 1 the temperature was 100 and pulse 100. In the evening the temperature was 99 and pulse 104. No material pain in region of the appendix but unmistakable signs of pus formation. The patient was taken to St. Mary's Hospital and a large appendicular abscess opened and properly drained. Bacterial examination of the pus showed colon bacilli and pneumococci. The presence of the pneumococcus to my mind explains why the inflammatory process was not absorbed, the vaccine which was used having been streptococcus and colon bacillus. After this pneumococcus was added to the vaccine and inoculations repeated at from three to five-day intervals, eight more doses being

used. He made a good recovery. The one feature of this case that impressed me very much was the practical absence of pain while this large abscess was forming.

Mrs. B. had had an attack of appendicitis about six years previously when I treated her with rest and an ice-bag and no food. At that time she made a good recovery. This last attack started with a severe pain during the night. She called in a physician from the neighborhood who gave her practically the same treatment as she had received for the previous attack. As she was not progressing favorably, she called me on the evening of the fifth day stating that the other physician had insisted on the necessity of an operation, to which she would not consent. Upon examining her I felt that the other physician was right, there being an inflammatory mass about the size of a large orange, distinctly palpable in the region of the appendix. Her temperature was 100.4, pulse 99. I considered immunization before operation in such a case essential and accordingly gave her a dose of streptococcus-colon bacillus vaccine with the intention of advising an operation the next day. The ice-bag, no food and absolute rest in bed were continued. The following day her temperature was 99 and pulse 84 and she was feeling much better, the pain subsiding. On the 3rd the temperature was 100 pulse 96 but other conditions favorable. Another dose of the same vaccine was given. After that she continued to improve rapidly, she was given

an inoculation on the 7th and the last on the 11th when all the inflammatory condition had subsided. I inquired carefully about the character of the stool every day to ascertain if any pus had discharged but nothing of the kind was determined. I saw the lady recently and from all indications she is entirely well.

Mr. E. had a well marked appendicitis when I saw him on May 22. I advised absolute rest in bed, an ice-bag, no food and gave streptococcus-colon bacillus combination vaccine. Repeated the dose on the 24th and again on the 27th. By this time he felt so well that to my surprise I found him sitting up all dressed visiting with the family. There was still slight tenderness so I ordered him back to bed, but from what I learned later, instead of heeding my advice he went to work. About a week later I heard that he was in a hospital being operated on for appendicitis and finally learned that he had died.

Another case was treated by one of our prominent surgeons for several days who would not assume the responsibility longer without operating. The man objected and called me. I gave him a dose of streptococcus-colon bacillus combination vaccine and by the next morning found considerable improvement. A day later, however, I felt that an operation should no longer be delayed and advised that course. I was promptly discharged and later learned that the patient recovered without an operation.

My son had had three slight attacks of appendicitis which were treated with rest in bed, ice and no food. During the spring of 1908 he had an attack which was more severe than the others. Temperature 101 with a distinct inflammatory bunch in the region of the appendix and the characteristic rigidity of the abdominal muscles. I was especially disappointed because this happened the week before the A. M. A. meeting at Chicago which I was very anxious to attend. There was some improvement after the first inoculation and on the third day the vaccine was repeated. Twenty-four hours after the second injection the temperature became normal and the swelling began to subside. On the fifth day swelling and tenderness were all gone and everything looked so favorable that I attended the A. M. A. meeting. No further treatment was employed the case resulting in a complete recovery. He is now twenty-two years old and enjoys perfect health not having had the slightest return of the trouble.

In one case the acute symptoms rapidly subsided over the appendix. I advised an operation and the appendix was removed resulting in a complete recovery. All the other cases were treated with the same vaccine making inoculations at from two or three-day intervals. They all made uninterrupted recoveries.

Dr. Southwick of London (**New England Medical Gazette**, Jan., 1912, p. 12) among other things refers to the following case: "Dr. Craig reports

many interesting cases successfully treated by vaccines. Amongst others was a man sixty-five years old who entered the hospital at the end of a prolonged spree. He was on the verge of delirium tremens and had a very severe appendicitis. He was in such bad condition that it was considered hopeless to operate and the last rites of his church were administered. He was given a vaccine made from the interior of an appendix removed the day before from a very severe case of perforated appendix, the vaccine being ready for the patient in case he needed it. It consisted of a mixture of streptococci and colon bacilli. The patient made a remarkable recovery, was out of bed in a week and left the hospital four days later."

In making bacterial examinations following operations on those cases of appendicitis which have come under my care, pneumococci were found twice and streptococci once while colon bacilli were found in all the cases. This includes a few bacterial examinations made in other cases besides my own.

One of the most characteristic features following the vaccine treatment in appendicitis is the influence the vaccine has in relieving pain. As pointed out by Wright this can be accounted for on the ground that when the immunizing powers are raised during an active infection the pain subsides.

It may be argued that the beneficial results were mainly obtained from the ice-bag, rest and no

food. In reply to that I can only say that I used the latter treatment for ten years before I used the vaccines, and that the prompt and decisive results that are obtained with the vaccine treatment, were noticeably absent. Try it and convince yourself. In acute cases the dose should be repeated in two or three days and in subacute cases at five-day intervals.



CHAPTER XXV.

The Amelioration of Digestive Disorders.

SOON AFTER USING VACCINES in cases having chronic rheumatism, I was impressed with the tonic influence which seemed to be exerted on the system generally and more especially with the beneficial effects on the digestive organs, improvement in the digestion often taking place before the inflammatory conditions of the joints began to be improved. This tonic influence was also observed when vaccines were given for bronchitis, "colds" and other troubles. Here I can speak from personal experience, having myself taken vaccines for "colds" with which I formerly was greatly annoyed. The appetite is one which requires a lunch between meals, and the digestion is equally good.

From such experiences the idea of using vaccines in cases of indigestion where the trouble could not be ascribed to any organic cause naturally suggested itself.

The proper care of digestive disturbances is a very important factor in every day practice. There is probably no organ of the body more abused than the stomach and with the usual kind of treatment that the stomach receives, it is not unreasonable to suppose that the rest of the intestinal tract may

become involved. Where dietetic and other abuses are continued it would be useless to expect relief from the vaccine treatment. The dilated stomach of the excessive beer drinker, the irritated stomach of the alcoholic, impaired digestion from improper food and over-eating are all conditions that require special attention, but diseased conditions due to the invasion of infective organisms following digestive abuses must also be considered important in the treatment of these cases. If an infection has once taken place as a consequence of a prolonged debauch it does not necessarily follow that the infection will voluntarily subside later, when proper living is resumed.

The proper function of the liver is an important factor in digestion as well as the process of assimilation. Irritating substances absorbed from the digestive tract and circulated through the liver by the portal vein no doubt predispose to infective processes of the liver. Excessive use of alcohol has long been recognized as an etiologic factor in cirrhosis of the liver. Experiments on lower animals, however, show that the irritant itself does not necessarily produce the disease but simply creates a condition favorable for infections by pathogenic organisms which complete the chain in the disease process. This is aptly pointed out in an editorial in the *Journal A. M. A.*, Jan. 21, 1911, page 200 from which I will quote as follows:

“E. L. Opie in his experiments has shown that
ia in association with toxic substances hav-

ing a special affinity for the liver, such as chloroform and phosphorus, may produce changes which neither the poison nor the bacteria can cause when acting alone. The possibility that disturbances of metabolism in man may produce changes in the liver similar to those caused by such poisons is well illustrated by the toxemia of pregnancy, in which persistent vomiting is associated with central necrosis of the hepatic lobule similar to that caused by chloroform. The experiments show that the activity of the hepatic poison may be so intensified by bacterial infection that a quantity of the poison which alone produces little change, may in combination with *bacillus coli* and *streptococcus pyogenes*, cause destruction of almost the entire hepatic parenchyma. Some bacteria (e. g., *colon bacilli*), which have little pathogenicity for the normal animal are virulent for the animal whose liver has been injured by chloroform or phosphorus. It is possible that those instances of acute yellow atrophy which accompany infection with *streptococcus pyogenes* are dependent on some disturbance of metabolism or other form of intoxication which has rendered the liver unusually susceptible.

“The experiments, furthermore, show that bacterial infection can influence and even determine the development of cirrhosis of the liver. Degenerative changes which usually undergo rapid repair may cause sclerosis when combined with bacterial infection. Whereas cirrhosis may be

caused by chloroform without bacterial inoculation, the introduction of bacteria hastens the progress of the chronic change. The poison in large quantity rapidly causes death, but a much smaller quantity in association with a relatively non-pathogenic micro-organism produces a lesion from which recovery is possible. Such insults repeated at intervals produce the chronic changes of cirrhosis.

"This experimental work suggests the explanation of the fact that some alcoholics escape cirrhosis, while temperate persons and even total abstainers sometimes develop the disease. In the latter case we may assume that the toxic element of the etiologic combination arises from the production inside the body."

Cases of acute indigestion associated with diarrhea are almost invariably of bacterial origin and toxic material from this source circulating through the liver may cause sufficient irritation to start an infection. It is not an uncommon experience to have a catarrhal jaundice follow an attack of diarrhea. These hepatic catarrhs are caused by colon bacillus infections which in all probability had their origin in an irritated condition due to toxic materials absorbed from the impaired digestive organs.

Colon bacillus vaccine is being extensively used in catarrhal jaundice with marked beneficial results. I have used colon bacillus and streptococcus combined vaccine in a few cases. The results were

very pronounced. The improvement could be observed after the first inoculation in every case. Inoculations were made from five to seven days apart. One case received but one dose, two were inoculated twice, one three times, and one four times.

Mild forms of infection may exist without producing the extreme symptoms observed in a case of jaundice. Infective processes are frequently seen where the contest between the tissue cells and the invading organism is so well balanced that the diseased condition remains about the same for months. This is especially true in milder forms of infection. Where an infection is active the systemic defense is more liable to be aroused for the production of immunizing substances. In an alcoholic, during the early stages of cirrhosis of the liver we probably have a subdued infection following the wake of the alcoholic irritant. The same condition would hold good with cases of non-alcoholic cirrhosis where the hepatic irritant may have its origin in bacterial products absorbed from the alimentary tract during digestive disturbances.

With a raised immunizing resistance combined with the general tonic influence of vaccines much can be accomplished by this treatment in cases that are not amenable to ordinary methods. In digestive disturbances, the recognized general rules of proper dieting and bowel regulation should also be observed. The influence of vaccines in cases of constipation has often impressed me

much. With an improved appetite and good digestion a surprising regularity of the bowels often follows without any other treatment.

On the question of diet I find that the amount of salt taken with the food has some relation to persistent hyperacidity of the stomach. Common salt being the source of the chlorine for the production of hydrochloric acid in the stomach, it occurred to me that by giving a salt-free diet in such cases the hyperacidity might be checked. Two years' experience with this method of handling these cases fully sustains my opinion. To get the benefit of the salt-free diet it must be kept up for three or four weeks.

I have used vaccines extensively in the direct treatment of digestive disturbances and feel that they should be uniformly applied in these cases. Where no malignant condition exists good results may nearly always be looked for. In gastric ulcer I have had practically no experience, but it would seem to me that here vaccine therapy should be of great value.

In conclusion I wish to give the results in two interesting cases:

A young woman complained of having had trouble with her stomach for seven years. Had thirty pounds in weight, and weighed only 70 lbs. Some tenderness on pressure was noticed and also a slight pain in the back. She ate very sparingly and was distressed by belching of distress and belching of

The tongue was coated, bowels
he slept well. She had been
ans, but was steadily fail-
ed to me by one of my
rally was prepared for

her with streptococcus and
ation making inoculations at
s. After the fourth inoculation
improve and the treatment was con-
ne had had eight inoculations, then
were extended to fourteen-day inter-
g the summer she went to the coun-
few weeks and came back with a fever.
t recognize the character of the fever at
t soon found it to be a typical case of ma-
Vigorous quinine treatment broke up the
er, but all she had gained from the vaccine
atment was lost.

About a month after she had recovered from the malaria, the vaccine treatment was started again. She soon began to improve and after receiving ten inoculations seemed to be entirely well. She has gained twelve pounds in weight, feels stronger, has no more distress after eating and in every way is better than she has been in many years.

A middle aged woman had been bothered with indigestion for three years. I treated her with tonics and other conventional remedies for two months with no benefit. She had tried other phy-

sicians with no better results. I was at that time treating her father for rheumatism and the suggestion of giving a vaccine for her dyspepsia was readily accepted. She made a complete recovery after five inoculations of a streptococcus and colon bacillus vaccine. A year and a half later she had another attack of indigestion for which the same vaccine treatment was employed. She began to improve after using the vaccine and after eight inoculations at five-day intervals made a complete recovery.



CHAPTER XXVI.

The Vaccine Control of Auto-Intoxication.*

SINCE THE DAYS OF BOUCHARD, with his masterly work in the discovery of auto-intoxication and its important bearing upon this subject, it has been studied with avidity, and if the reader will take the time to go through the various indices to current medical literature he will be astonished at the number of articles that have been written regarding auto-intoxication and conditions directly related to this disease.

It has been said that auto-intoxication is the fashionable disease nowadays—we all have it to a greater or less degree, and progressive physicians take it into consideration in the treatment of practically every case that comes to their office. The religion of “clean up, clean out and keep clean” has made success for many physicians, and one cannot deny the immense importance, in both the augmentation of therapeutics and the prophylaxis against disease, of a knowledge of the amount of poisons that may happen to be in the human system, and their influence upon its normal workings.

It will not be for me to discuss the etiology of auto-intoxication nor to outline its insidious influence in the causation of such an immense number

* I am indebted to Dr. H. R. Harrower for this entire chapter.

of conditions which physicians have to meet every day, but I would like to emphasize the fact that auto-intoxication is a germ disease. There is no question at all that the bacteria causing intestinal putrefaction are factors to be carefully considered in the treatment of this condition, and while it is entirely possible to unload from the bowels immense hordes of these invading organisms, the resistance of the patient to their onslaught has not been influenced sufficiently to prevent a recurrence of the same trouble.

We will not belittle the orthodox methods of treating this condition, but rather will make this the place to suggest the possibility of adding to our means of combating this all too frequent condition by the use of bacterial vaccines.

If the philosophy of vaccine therapy is correct—if it is really possible to influence the body's resistance to a specific organism by introducing into it dead suspensions of the organism in question, then it is more than likely that vaccine therapy may eventually become our most valuable adjunct in the treatment of auto-intoxication.

Let us briefly analyze the circumstances as we know them. Auto-intoxication is, in nine cases out of ten, yes in ninety-nine cases out of a hundred, due to the putrefaction or fermentation of undigested food materials in the alimentary canal. Fully two-thirds of this trouble is due to the putrefaction of proteid matter, and a brief insight into the bacteriology of proteid putrefaction as we find

it so commonly in the intestines, will serve to convince the progressive reader of the reasonableness of our premise.

The normal bacterial flora in the intestine—chief among which is the ubiquitous colon bacillus—are frequently rendered seriously virulent by the conditions which gradually assert themselves in the intestinal canals of individuals suffering from this fashionable disease. Instead of restricting its activities to feeding upon the normal waste of digestion, the colon bacillus becomes an actually pathogenic organism. It is a pus producing germ, as all know, and frequently the condition of toxemia is made worse by an actual infection of the intestinal walls themselves—a colitis, appendicitis, duodenitis, or other “itis.” This being the case, the physician that takes into consideration the immunizing power of vaccines in the treatment of colon bacillus infections has made a great step in advance in the control of auto-toxemia. If the resistance of an individual—to make it specific, the resistance of the cells of the intestinal walls of an individual—can be raised to the colon bacillus, it stands to reason that its pernicious influence will, to a certain degree, be diminished. If such a procedure is accompanied by the orthodox methods of treatment, or, if you wish it, the usual methods taken to combat auto-intoxication, are supplemented by vaccine therapy, the results are very much more encouraging than one would at first suppose.

Of course, the colon bacillus is by no means the only organism which inhabits the intestinal canal. The bacillus aerogenes capsulatus or Welch's bacillus, the bacillus enteritidis of Gaertner, the bacillus paratyphosus, and, not uncommonly, the bacillus typhosus, are associated with the ever-present colon bacillus. It would seem, then, that a study of the fecal bacteriology might be a means to satisfactory ends in the control of intestinal toxemia, and those who have had the initiative and interest to investigate this, have found that in the majority of cases of this disease—for there is no question that auto-intoxication is actually a disease in itself—certain germs are present. The combination is usually that mentioned above, with the colon bacillus in the predominance, and the Welch bacillus second in numbers but possibly first in virulence. Therefore, it is possible to secure the bacterial vaccine which would tend to secure a resistance of each of these organisms, would it not also be possible to be able to treat these cases with greater and much more satisfactory results. For some time it has been noticed that patients receiving injections of colon bacillus vaccine have not only responded favorably to the condition for which they were being treated—cystitis, endometritis, appendicitis, etc.—but their general health was noticeably bettered. It is quite possible that the tonic influence of vaccines to which reference is made elsewhere must be credited with much of its virtue to the influence

of the bacterial inoculation upon the intestinal infection.

To close, then, it would seem that the appreciation of the fact that vaccines can influence intestinal infections just as they can influence infections of the skin, general infections or other infections, will teach us that vaccines may be used with equal advantage in the treatment of intestinal infections, and it is safe to prophecy that in the years to come the progress of vaccine therapy will include the treatment of auto-intoxication, and the progressive element in the profession will be using bacterial vaccines, not only as a prophylactic before a surgical operation upon the abdomen, but as a prophylactic in the non-surgical cases also.

If these ideas have a real sensible fundamental basis, if the results already obtained are not accidental or incidental, the possibilities for good in vaccine therapy are as yet barely touched upon. It is not too much to dream that the physician of the future will likely inject into the arms of patients a specific vaccine for the common intestinal infections, clean out the patient thoroughly, and send them on their way rejoicing, and, if the experiences that have already been obtained in this work, both clinical and bacteriological, are to be believed, the day is not far hence when this will be an actual fact.

CHAPTER XXVII.

The Tonic Influence of Vaccines.

THE TONIC EFFECTS of injections of vaccines have been frequently mentioned by me before, but this by-effect of vaccine therapy is really of sufficient importance to deserve a special chapter. Many remedies and methods of treatment are described as having tonic effects and for that reason this term has been somewhat loosely applied. Generally speaking any treatment that aids in building up the system is considered a tonic. This applies to the bringing about of an increased healthy metabolism with augmented cell activity. Many measures in common use have this stimulating effect on cell activity among which are wholesome exercise in the open air, the influence of sunlight, properly applied hot or cold baths, massage, electric radiation, etc.

I. M. Mullick, M. A., M. D. (**Calcutta Medical Journal**, Aug., 1911, p. 41) gives a detailed report of the increased metabolic activity in a variety of cases as indicated by increased body weight and increased elimination as shown by a greater quantity of solids eliminated in the urine during the 24 hours. In part he says: "These facts certainly give us some light as regards the changes within. Very probably it is this: (1) That vaccines stimulate

metabolic activity, increase elimination of waste and rebuild tissues. (2) That they hasten catabolism, especially of weak and unhealthy tissues and help the building or regeneration of the healthy ones. In other words the tissue cells are influenced in such a way that they change rapidly, break down where they are weakest and regenerate in a more normal and healthy way. As already said I have similar records of many such cases, although the records are not always so consistent on the whole, it may be affirmed that vaccines stimulate metabolism.

“Even in old people this is evidenced; but in the young with their tissues in a higher state of vitality, this vital response is the most marked. Now one very important bearing that this has is its general applicability and usefulness in all diseases, and in convalescence as a secondary help. Especially in this latter case such treatment may probably materially help convalescence by enabling the system to better eliminate effete material and toxins, and at the same time by a better regeneration of tissue and body weight. For this purpose any mild and innocuous vaccine will do, preferably staphylococcus which is the commonest and the most mild to man.

“Summary and conclusions—I. Vaccine injections have a profound and favorable influence on metabolism.

“It increases the elimination of waste and at

the same time tends to cause an increase in body weight.

“II. This metabolic aspect of vaccine therapy is as important a study as the others—its phagocytosis, opsonins, agglutinins, precipitins, etc.

“III. Different methods of preparation are useful for different purposes—the medium, sterilization, dosage and mixed vaccines.

“IV. Besides the specific action, vaccine inoculations improve the general condition by inducing a healthy metabolism as mentioned above.

“V. Hence it is useful in diabetes, p. p., malassimilation of invalids. Proteid nourishment, oxygen, and elimination of waste matter helps the efficiency of vaccine.”

Dr. V. Dabney (*New York Medical Journal*, Feb. 10, 1912, p. 275) proposes a plausible explanation of the tonic effect of vaccines on Ehrlich's side chain theory: “The limiting of the spread of infection was observed as one of the effects of vaccines in throat cases; so here, where the infections are more prone to linger, and the elaborated toxins to become absorbed, is exhibited more prominently the striking effect on metabolism. Bruce invited attention to the remarkable effects of vaccine therapy in building up the physique of patients suffering from chronic mania, in whom lack of nutrition is so often a prominent symptom. The same corrective tendency is to be found in the treatment of chronic middle ear diseases. However, this is not to be accounted for solely by the

cessation of the suppurative process, as metabolic changes are slow ordinarily after the local lesion ceases to poison. In long suppuration of the middle ear, and in stubborn sinuses following the various mastoid operations, there is encountered often a septic condition, almost a cachexia, in a patient, whose anemia, depleted vitality, and loss of appetite are familiar to all otologists. The speedy correction of this untoward state and the cessation of the pus formation are, under vaccine administration, the results of one and the same process, so brilliantly exploited by Ehrlich in his side chain theory. In brief, the receptors previously having in health the function of uniting with a food molecule and assimilating it, under disease conditions unite with a molecule of toxine, thus shutting off that much nutrition from the body. Naturally when the toxins are numerous, numerous receptors are pre-empted by them, and the metabolism of the body suffers proportionate detriment. Thus destroying these toxins, the vaccine renders available for food assimilation receptors heretofore occupied with toxine assimilation. The apparent effect of vaccine therapy on metabolism seems to bear out this theory.

“From the fact that pathogenic bacteria are more or less with us at all times it is fair to assume that at least some of them have a stimulating influence on metabolic activity. In actual life it is not an uncommon experience to find children or even adults, where an undertone of vitality ex-

isted for years, develop robust health after recovering from some infectious disease. No doubt even in a condition of health the immunizing faculty of the system is often called into activity to guard off infecting organisms without the individual becoming aware that an infection exists and in all probability these repeated slight immunizing responses are to a large extent responsible in sustaining an immunity and a normal standard of vitality."

By using a bacterial vaccine, then, we take advantage of one of Nature's evident methods in stimulating cell activity. After recovering from an infectious disease quite generally we find an increased activity of the body functions to regain what was lost during the illness and often this activity goes beyond the previous standard. By recourse to vaccine therapy we create a condition of cell activity which simulates that caused by an infection without the disease.

As a result of such treatment we find an increased number of leukocytes in the blood, a good appetite with an increased desire for food, an active digestion and assimilation associated with a feeling of general well being. This can be experienced by any one who will take two or three average adult doses of a vaccine at three or four-day intervals even when he is presumably in good health. I find that streptococcus vaccine has the most pronounced effect in this respect although staphylococcus, pneumococcus, colon bacillus and

other vaccines will frequently produce a similar result. In treating chronic diseases I have often noticed that a feeling of general good health with an increased appetite is the first indication of recovery. This has been particularly observed in cases of chronic rheumatism, neuritis, and arthritis deformans. In such cases I have often found myself wondering whether it was the immunizing or the tonic effect of the vaccine that was the most important.

This general tonic effect of vaccines may be applied to advantage in many instances where other remedies fail. From this it should not be inferred that vaccines will do everything. I frequently find that in anemic cases the response to the vaccine is slow but if in such cases the vaccine is given in conjunction with the hypodermic or intravenous use of some iron preparation the results are better than when either the vaccine or iron are used alone. The same is true with regard to other therapeutic measures known to have a tonic effect. The vaccines will not interfere with any other remedies used but will aid them. I have used vaccines extensively in this way and feel confident that much good can be accomplished with them.



CHAPTER XXVIII.

Vaccines as Adjuncts and Prophylactors in Surgery.

THE BENEFICIAL RESULTS of surgical interference in inflammatory conditions associated with pus formation have been so generally recognized that many operators consider their duty in such cases ended when adequate drainage has been established. A self-satisfaction that everything possible has been done is often a great hindrance to progressive work. In operating on cases where pus exists there is always danger of the infection extending in the tissues opened up as a result of the operation. Many times pus cavities are deep-seated and extensive operating is necessary to reach the seat of trouble. In all such cases the immunizing influence of vaccines is of unquestionable value. Many operators recognize the value of vaccines in septic wounds and give them after clinical symptoms indicate that the infection has extended. In a recent publication I notice that a surgeon had an autogenous vaccine prepared from streptococci and colon bacilli isolated from the removed appendix to be given to the patient "in case he needed it." Here is a case where the infection existed and if vaccines are of any value he needed it before clinical symptoms indicated a

past operative extension of the process to avoid such extension. A better method still is to give the patient a stock vaccine corresponding to the infecting organisms just after the operation. This will avoid the necessary delay incidental to making autogenous vaccines and the patient will obtain the benefit of early treatment. This method has given me such uniformly satisfactory results that I can unhesitatingly recommend it as a routine procedure.

Another class of cases where vaccines are advantageously used is in wounds from accidental injuries. Here the tissues have been cut, bruised and lacerated without the aseptic precautions observed on the operating table, making infections always more or less liable to occur. To give such cases antitetanic serum where the wound was made under conditions making tetanus infection probable is now recognized as the only rational procedure. In accidental injuries staphylococcus and streptococcus and frequently infection by both organisms is always probable and to give a prophylactic dose of combined streptococcus-staphylococcus vaccine is just as reasonably indicated as the tetanus prophylaxis above referred to.

The following case reported to me by the courtesy of Dr. J. Walter Wood of Port Richmond, N. Y., is a good illustration:

“On Dec. 23, 1911, I was called to attend Miss K., age 19 years, suffering from a compound comminuted fracture of the skull, having been struck

by a hatchet. She was suffering from extreme shock, no pulse at wrist. She had lost a great deal of blood, and the brain was protruding from the wound. She had walked unassisted about 1,000 feet after the assault. I stuffed the wound with iodoform gauze, applied a bandage and removed her to the hospital. After arrival at the hospital, the shock was still so profound that I deferred operating until the following morning. Several splinters of bone were removed as well as a large piece about four inches in diameter, the periosteum having been stripped up. A portion of the brain tissue had to be removed in order to approximate the dura mater. I then replaced the bone, after leaving a silk-worm gut drain to the brain and another drain external to the bone. I was criticised by my confreres for replacing the bone, as they said there was nothing to nourish it. I replied that it beat all the artificial plates going.

I then immediately had mixed vaccine, of streptococcus and staphylococcus, injected and repeated again three times at intervals of three days. The young woman made an uninterrupted recovery, although there was a paralysis on the left side for about two weeks. She now appears to be perfectly normal. The wound healed by first intention. I credit the remarkable results in this case to the vaccine."

Bacterial vaccines are also coming into use as prophylactors in operative cases where no positive indications of infective processes exist.

Dr. W. H. Watters (*New England Medical Gazette*, Jan., 1912, p. 16) has summed up the situation better than I could: "One interesting subject now under investigation is the immunization of surgical patients against post-operative infection. While the great improvement noted in surgical technic during the past two decades has largely eliminated the question of sepsis, nevertheless, there is always the latent possibility of such and in instances all too numerous this becomes a very active matter. In a moderate number of individuals we have immunized against staphylococcus and streptococcus and at times against bacillus coli (abdominal and vaginal operations). Following these has been absolutely no trouble from sepsis, although they were cases picked for their apparent susceptibility of such. In one a hematoma developed in the abdominal wound and from it were isolated both staphylococci and streptococci in numbers. The surgeons predicted an extensive infection, with probable secondary operation to clear out the infection. It did not cause any trouble, however, did not become purulent beyond the already present blood, and merely retarded convalescence for about a week. Further work in this kind seems well indicated."

I often wonder why it is that so many good physicians are so conservative about adopting new methods. A recent incident quite forcibly impresses this upon me. A particular friend of my son-in-law was struck by a car and received serious

injuries to the head and brain. He was taken, unconscious, to the hospital where one of our leading surgeons had charge of him. One and a half days after the accident I was requested to call up this doctor and inquire about the patient's condition. The doctor informed me that he was still unconscious and that he had sustained a severe compound fracture of the skull with injury to the brain. I suggested a prophylactic dose of vaccine but this was objected to on the ground that in the absence of fever there was no evidence of infection and that it would be ample time to use the vaccines if fever should develop; not realizing that an infection often advanced sufficiently to do serious damage before fever develops. This doctor evidently does not believe that an ounce of prevention is worth a pound of cure.*

It will not be long before the prophylactic vaccine inoculation will become a part of the pre-operative routine just as the blood count and the urinary test. The absolute harmlessness of such a procedure is unquestioned, and the only thing that must be overcome is the conservatism of certain members of the profession which, I am tempted to believe, often amounts to retrogression. Such conservatism, however, cannot alter the fact that vaccines may be advantageously used as prophylactors in surgical work.

* While the manuscript of this book was in the printers' hands, I learned that fever did develop in this case and the patient died. Surely this was an expensive lesson.

CHAPTER XXIX.

Vaccines in Infections of the Eye.

INFECTIONS OF THE EYE are quite common and are encountered by the general practitioner almost as frequently as the eye specialist.

Conjunctivitis is seen in acute and chronic forms. The important varieties are caused by the gonococcus, pneumococcus or streptococcus. The staphylococcus is also found, but usually as a secondary invader after the other organisms have paved the way.

Where a purulent conjunctivitis exists in cases having gonorrhea it should be regarded as gonorrheal until otherwise determined by bacterial examination. Gonorrheal conjunctivitis is always a serious affair. Often the intense inflammatory condition causes so much swelling that the pressure from the swollen tissues interferes with the nutrition of the cornea resulting in corneal ulceration and not infrequently total or partial destruction of the cornea.

Here the early use of gonococcus vaccine is of utmost importance. By immunizing against the infection, deep-seated tissues will not become involved and where extensive swelling exists it will subside. It appears that in such cases the best results are obtained by giving large doses. From the

literature on this subject it seems that indifferent results were obtained by giving small doses ranging from two to ten millions. Allen recommends 250,000,000 of stock vaccine to be given at once after making a diagnosis. He reports four cases in which marked beneficial results were obtained by this method. I have given 50,000,000 stock gonococcus with good results in one case making inoculations at five-day intervals. In gonorrheal conjunctivitis appropriate local treatment should not be neglected while using the vaccine.

Streptococcus conjunctivitis is met with in every form, from an extremely acute inflammation with much swelling to a comparatively mild condition. In cases of *pneumococcus conjunctivitis* there is usually not so much swelling. In many cases we have mixed infections of both organisms and the *staphylococcus* frequently also becomes an additional invader. The early control of these cases is essential because of the danger of corneal involvement, especially where much swelling causes pressure, and resulting interference with corneal nutrition.

As a rule the general practitioner is not in a position to make a bacterial examination at once in these cases, and early vaccine treatment being important it is entirely practical to give a combined stock vaccine consisting of streptococci, pneumococci and staphylococci. My experience with this method has been so satisfactory that I would consider it gross negligence not to give these

cases the benefit of the vaccines. Treatment should be started with the average dose and in bad cases it is advisable to repeat the inoculation in twenty-four hours. In less severe cases injections should be made from two to four days apart.

Dacryocystitis is nearly always caused by the streptococcus and frequently follows acute conjunctivitis. Where an abscess has formed and opened through the skin, staphylococci are also found. Combined streptococcus and staphylococcus vaccine has given me none the less brilliant results in these cases. If the vaccine is given early, the inflammation will subside without pus formation, and where pus must be evacuated the inflammation subsides promptly with a rapid healing of the wound. An important factor of the vaccine treatment in these cases is that from the short duration of the inflammatory process fistulas and obstructions of the lachrymal canal are avoided.

Chronic conjunctivitis is sometimes due to the Friedlander bacillus but more frequently to the bacillus lacunatus. A careful diagnosis from bacterial examination is always necessary in these cases. Being of a chronic nature a few days delay in treatment while the examination is made does no particular harm. Cases caused by the Friedlander bacillus respond poorly to local treatment but are amenable to the Friedlander bacillus vaccine. Treatment should be started with 200,000,000 and repeated at four or five-day intervals with gradually increasing doses. Good results are ob-

tained with the vaccine treatment in chronic conjunctivitis caused by the bacillus lacunatus of Morax-Axenfeld. He advises starting treatment with 100,000,000 organisms and repeating inoculations at from seven to ten-day intervals. If prompt relief is not obtained after two or three inoculations the dose should be increased to 250,000,000 when results are usually obtained.

Corneal ulcers seem to be caused by a variety of organisms the most important being pneumococci, streptococci and staphylococci. I have found these organisms in pure culture and also in mixed infections. They may take an acute or chronic form, the pneumococcus predominating in the chronic varieties. The micrococcus catarrhalis and the bacillus pyocyaneus are also occasionally found.

As a routine treatment in these cases a combined strepto-pneumo-staphylococcus vaccine gives good results. If no prompt relief is obtained after one or two inoculations bacterial examinations should be made to determine if any other organism is present. In corneal ulcers due to want of a direct blood supply the problem of disposing of the infecting organism is surmounted with difficulties. Ordinarily not much repair takes place until small blood vessels develop in the cornea to supply nourishment to the ulcerated area. This is always a slow process. With the use of vaccine I have seen these ulcers heal over before the development of an additional blood supply takes place, showing that the blood serum under the in-

fluence of the vaccines has developed additional germ-destroying power. A corneal ulcer is such a small affair that practically no systemic immunizing impression is produced, but with vaccines this necessary influence is speedily brought about.

Dr. W. A. Mann of Chicago in a personal communication gives the following interesting experiences:

"I began using vaccines in my work without taking the opsonic index with a view of determining by clinical results if such procedure could be done with satisfactory results. In some of my cases the germ of infection could not be isolated, and the vaccine used was based on laboratory examinations of similar cases by pathologists. In some cases it was guesswork and based on the theory of rheumatic diathesis as a cause, and that streptococcus was a possible factor in rheumatism. Injections were given subcutaneously, and repeated in five to seven days. Thirty million was the dose of streptococcus and 100,000,000 of staphylococcus.

Phlyctenular Corneal Ulcers.—Case 1. Miss B. An ulcer with relapses. Had a suppurative chalazion, blepharitis marginalis, pyorrhea alveolaris and acne. Mixed staphylococcus (aureus, citreus and albus, 100,000,000 each) vaccine was given; three doses at intervals of one week. The ulcer promptly healed and the acne and pyorrhea alveolaris were much improved.

Case 2. Miss C. B. Healing irritable ulcer, severe acne, mixed staphylococcus and later staphylococcus albus. Ulcer healed slowly. Acne, marked improvement after first injection. Cured after five injections.

Corneal Ulcers.—Case 1. Mr. L. Traumatic infection about five years ago, leaving scar which had broken down and been curetted one year ago. Present attack has been most stubborn, and after two curetings has not entirely healed. Staphylococcus mixed and third curetting brought about healing.

Case 2. Mrs. C. Been treated by me for two former attacks. Ulcers have lasted from two to four weeks. Third attack looked as if it would be as serious as former ones. Was curetted and staphylococcus mixed given. Ulcer was healed on fourth day.

Case 3. Mrs. A. Large ulcer, three weeks. Improved twenty-four hours after staphylococcus injection and thereafter progressed nicely.

Iritis.—Case 1. D. W. A. Severe iritis; left anterior chamber full of pinkish exudate. Pupil slightly dilated, though under atropin given by Dr. C. W. East, family physician. History of two previous attacks, the first eighteen years ago—two years after luetic infection. First and second attacks of iritis run about six weeks. Present attack, one week. Has some rheumatism, and just had boil on arm. Is taking KI and mercury. Streptococcus vaccine was ordered, as my diag-

nosis was rheumatic iritis. On the third day there was an improvement as shown by diminished congestion and less pain. A second injection was given in five days, and eye was so well he left for Michigan.

Case 2. Mrs. E. Sixth day of left iritis, probably rheumatic. Was treated by atropin, heat and salicylates, and had run the usual course of two weeks. As the inflammation showed no reduction, streptococcus vaccine was injected. Pain and congestion lessened in forty-eight hours. No further improvement in ten days and a second injection was given, with marked improvement in forty-eight hours, and gradual return to the normal.

Case 3. C. A. Feb. 16, 1909. Three years ago treated by me for right iritis, losing three weeks' work. This attack in left eye, and injection given of streptococcus on third day, Feb. 19, 1909, when diagnosis was positive. Feb. 22, congestion less; marked improvement. Second injection on Feb. 27, although eye was about well. He lost one week from work.

Choroiditis.—Mrs. L. Circumscribed choroiditis, subject to neuralgia and rheumatism. Streptococcus was given every two or three weeks during the winter, stopping the choroiditis and lessening the neuralgia considerably.

I should advise streptococcus vaccine in rheumatic iritis and uveitis; in threatened and acute suppurations of middle ear until smear can be made;

in penetrating wounds of eyeball; in rhinitis, especially if accessory sinuses are involved. The staphylococcus should be used in phlyctenular ulcerations and in simple ulcers until a smear shows the infection. If no facilities are at hand to determine the infection, I can see no objection to using a combination of streptococcus and mixed staphylococcus, or alternate the injection, giving a dose of each every five or seven days."

In so-called "rheumatic iritis" we have a disease condition that is not only very painful and distressing but, under conventional treatment, very hard to manage. What is true of the iris applies equally to inflammation of the ciliary bodies. That the streptococcus is the infecting organism in these cases is apparent from the excellent results obtained with streptococcus vaccine.

The following is a good illustrative case: Mrs. R. Age 28, had been sick with acute articular rheumatism for about three months, four weeks of this time having been spent at a sanitarium receiving a course of baths. The rheumatic condition had improved, there being only a slight pain left in the knees. When I first saw her she had been suffering with iritis for about one week. The attending physician had been using atropine and considering the intensely inflamed condition the pupil was fairly well dilated but irregular. The conjunctiva was deep, red and much swollen, so much so that it was difficult to close the eye. The swelling also extended to the orbit causing the side

of the face to be swollen. The pain was very severe at night. The atropine was continued and in addition I gave the patient one dose of 30,000,000 streptococcus vaccine.

The patient told me that in eight hours after the inoculation she began to get relief from the pain and continued to improve. Five days later when I gave her the second dose the swelling and pain were gone, but some redness over the sclera remained. The atropine was discontinued and the inoculations of streptococcus vaccine were kept up at weekly intervals, four doses being given in all. She made a complete recovery.

I have used streptococcus vaccine as a routine in all cases of iritis where there is no history of syphilis with uniform good results. The relief from pain in these cases is so marked that the value of the vaccine at once becomes apparent to the patient.

Dr. Don. A. Vanderhoof (*Illinois Medical Journal*, Dec., 1909) reports a few interesting cases:

"On June 8, H. D. R., a barber by trade, came to the office for eye treatment. His trouble dated back five days, and, although under treatment by a physician, his condition had grown steadily worse. The eye had pained considerable ever since the trouble started; there had also been considerable lachrymation and photophobia.

"The day he came to the office he was complaining of considerable pain, both in the right eye and

also on that side of his head. Both the upper and lower lids were swollen, and there was deep corneal congestion. Pupil small and round. The tension of the eye was +1 and the patient complained of a great deal of tenderness during the examination. I used scopolamin in the eye and kept him in the office for about three hours. The tension soon became less, but the pupil dilated very irregular indeed. A few drops of dionin, 2.5 per cent. solution, was also used. He was directed to return home, to use hot applications and remain in a dark room. A laxative was also prescribed.

"June 9, pupil was still very irregular, and resisted all attempts to dilate it fully. Pain was severe at times. Same treatment was continued as previously given. June 10 at 3 am. he was taken with terrific pains in that eye and through the right side of the head. Hot applications were applied and a catharides blister used over right temple. Morphine sulphate one-fourth of a grain was given hypodermatically. Tension was +1 all that day so ordered a solution of dionin, cocain and atropin, to be used every two hours during the day.

"As there was no change in his condition that evening I gave him an injection of streptococcus vaccine 30,000,000, which is prepared by G. H. Sherman, of Detroit, Mich. June 12 he rested very well during the night, excepting between 4 and 6 a. m, when he had considerable pain. I saw him about 5 a. m. Found the tension normal, eyelids much less inflamed and the pericorneal injection

somewhat less. No pain on pressure this afternoon for the first time. Pupil still very irregular.

"From this time on he gained very rapidly, and in a few days he was back at his work against my wishes. A couple of days after his starting to work the eye became much worse, but I at once gave him another injection of the streptococcus vaccine. The iritis immediately quieted down and has caused no trouble since.

"Case 2. Mr. W. F. D., age 30 years, came to the office on June 2, saying that for five days he had been having considerable pain and lachrymation in his left eye. He had done nothing for it up to the present time. The case I diagnosed as one of simple iritis, and, as it had been troubling him for a few days before requesting treatment, I advised absolute quiet in a dark room, using scopolamin, dionin and hot compresses, besides advising him to pay strict attention to his elimination.

"The symptoms of iritis were all present here, so I will not enumerate them. Up to June 11 there had been some improvement. Pain at night had almost disappeared. On June 12 I gave him an injection of streptococcus vaccine 30,000,000. The next afternoon quite a change for the better could be seen. The pericorneal injection was less intense, and he could now open his eye just a little for the first time in a number of days. The case from this time on recovered rapidly. Nothing new developed and only one injection of vaccine was used."

In gonorrheal iritis gonococcus vaccine should be used. Dr. John E. Weeks (**Congress of American Physicians and Surgeons**, 1910, p. 73) reports two cases of gonorrheal iritis successfully treated with gonococcus vaccine.

In this connection it is well to consider that in cases of iritis where the patient has gonorrhea it does not necessarily follow that the iritis is gonorrheal. Streptococcus infections may just as well be present in these cases, so if no good results should be obtained with gonococcus vaccines in these cases it is fair to presume that a streptococcus infection is present and a corresponding vaccine should be used.

SYMPATHETIC OPHTHALMIA

In sympathetic ophthalmia we have an inflammatory process that is not easily accounted for, but from what is known about infecting organisms it is quite probable that these cases are caused by the infection extending from the diseased to the healthy eye. This is particularly probable where extensive acute inflammatory conditions exist in the infected eye. Here bacterial vaccines would no doubt be of inestimable value in limiting the infective process to the involved eye.

I treated a man who, while cutting the wire on a bale of hay, was struck by the end of the wire in the sclera at the corneal margin, the eyeball being penetrated. The eye received no medical attention for several days and when I saw it there

was extensive infection producing a pan-ophthalmia with much pain and swelling extending to the orbit. The seriousness of the situation was recognized but wishing to give him the benefit of the doubt a combined streptococcus-staphylococcus vaccine was given at once. Local treatment consisted of ice-cloth applications. One day after giving the vaccine the pain and swelling began to subside. I made four inoculations of the same vaccine at four-day intervals with the result that there was practically no pain during all this time, the patient being able to sleep at night without resorting to narcotics. The eye, however, showed complete disorganization and I advised enucleation, which I performed. On opening the eye-ball, after removing it, the interior was filled with pus and what interested me particularly was the slight amount of disturbance as found from the condition of the eye. To my mind this was conclusive evidence that the immunizing effect of the vaccines was responsible for this favorable condition. Such experience would naturally lead one to believe that vaccines would be potent remedies in avoiding sympathetic ophthalmia.



CHAPTER XXX.

Vaccines in Dermatology.

IN NO CLASS OF DISEASES has the use of vaccines been more thoroughly effective than in the various dermatoses. Some of the earliest work in this interesting field of research has been done in this specialty. This has been undoubtedly due to the fact that infections of the skin are so common, the infecting organism so easily procured, and the results of the treatment so readily observed.

Wright (Studies on Immunization, p. 203) gives a detailed report of a case of furunculosis complicated by sycosis and eczema of seven years standing treated with staphylococcus vaccine. The trouble started from an infected finger which resulted from a scratch while cleansing a tracheotomy tube. The infection extending to the hand, axilla and thence to the blood causing an endocarditis. Change of climate, every form of medical treatment and local applications of the most varied description had all failed to afford any permanent relief. From the clinical results obtained after the inoculations he says: "From the date of the first inoculation in October, 1900, the patient's condition began to improve. With the exception of two small superficial boils which developed between

the dates of the second inoculation and the third inoculation and two further similar small boils which developed in the earlier part of 1901, the patient has been absolutely free from furunculosis. The sycosis, eczema, and the affection of the eyelids also began to mend from the date of the first inoculation; the two former had practically disappeared within a month from the beginning of the treatment. The ophthalmia tarsi lasted a little longer. His face is now, and for a period of over twelve months, has been, absolutely clean and free from eruption."

Since the staphylococcus is normally present on the skin, it would naturally be suspected as being either the primary cause or a complicating factor in most skin diseases. From this consideration staphylococcus vaccines have been extensively used in a large variety of cases.

Dr. T. Caspar Gilchrist (*Medical Record*, Oct. 15, 1910) relates the results of his experience with the use of vaccines in the treatment of cutaneous diseases at the Johns Hopkins Dispensary and in private practice during the last three and one-half years. Over 300 cases had been treated. As far as vaccine therapy was concerned in the treatment of cutaneous affections, Dr. Gilchrist said his experience might be summarized as follows: He had found it to be a distinctly valuable adjunct to our therapeutics. The staphylococcus albus vaccine was of undoubted value in the treatment of all pustular affections of the skin, but especially, in

his experience, in the treatment of relapsing furunculosis, staphylococcic dermatitis, sycosis-non-parasitica, in certain forms of eczema, in pustular rosacea, and in acne when the disease was largely secondarily infected with the staphylococcus albus. He also found the vaccines to be of value in the treatment of erythema multiforme, especially of the relapsing bullous type, and in rosacea where the flushing were decreased by the vaccine therapy. It was also helpful in dermatitis heptiformis and pityriasis rosea, so much so that he would recommend vaccine therapy to be tried when the disease did not yield to the usual method of treatment. Bacillus acne vaccine he had found to be of great value, especially in the treatment of those chronic nodular relapsing types of acne vulgaris, and it has proved to be in his hands in a great many cases a curative agent.

On the importance of the staphylococcus in skin infections Dr. Martin F. Engman (**Congress of American Physicians and Surgeons**, 1910, p. 178) says:

“The relation of staphylococci to skin diseases is a fertile but difficult field for investigation. None fully realize its importance, not only as a factor in changing objective symptoms by secondary infection, but the varied phases of its primary chemotactic influence. Nothing is more interesting than the study of these cocci in the skin, their morphology, chemical qualities of their toxins, multiplicity

and variety of lesions caused by them, or their behavior under remedial agents.

"It is curious to note the great variety of lesions procured on the skin by these cocci, which, upon cultural identification, will at one time prove to be of the aureus type, and at another, from a similar lesion, of the albus type. We have for many years believed that the morphological differences in this group of cocci meant nothing in their chemotactic qualities; that the former were largely due to incidents of growth and environment, and that such a coccus from a boil may present no morphological differences from those from a bullous impetigo or pustular eczema. Working on this assumption we have in experimenting with stock vaccines, purposely paid no attention to the variety of coccus grown from a case, and have used suspensions of the staphylococcus albus for the treatment of cases from which was grown the staphylococcus aureus with as brilliant results as if an autogenous vaccine had been used. This we have done time and time again. Polyvalent staphylococcic vaccines have in like manner been used with as good results. It is our experience, however, that the suspensions of the white coccus for general use are efficacious. The staphylococcus on account of its constant occupancy of the normal skin, is an agent of great importance in dermotherapy, as it enters as a secondary factor in almost all diseases of the skin."

Since so many diseased conditions of the skin are caused by germs it is quite natural that antiseptics of various kinds are extensively used in the treatment of these ailments. The value of local antiseptics is largely dependent upon whether the infection is superficial or down in the follicle.

Obviously surface infections are more readily cared for by this method than where the trouble is deep-seated, but in treating skin diseases the destruction of the infecting organism is not the entire problem. Staphylococcus and other infecting organisms are normally found as saprophytes on the skin and only become pathogenic when conditions arise which make a deeper invasion of the tissue possible. The most important of these conditions is a lawered resistance to the infecting organism.

Local treatment may effect a cure but from the want of sufficient immunity the condition may return. By using vaccines, however, the aim of the treatment is directed towards raising the immunizing faculty, thus establishing a more prompt and more permanent recovery.

ECZEMA.

The advantages of this method are very beautifully illustrated in certain cases of staphylococcus infections such as eczema and folliculitis of the moist variety. Here the skin is literally bathed with blood serum oozing from the follicles, but being of low immunizing power the germs con-

tinue to grow without apparent hindrance. In many of these cases local antiseptics are of little avail while staphylococcus vaccines give prompt relief.

The following case is a good illustration: Mrs. R., age 40, a short, corpulent woman, was suffering with moist eczema. The trouble started at the vulva with intense itching and continued to spread until it involved the legs to both knees and up the trunk to the belt-line. She had been under the care of several good physicians for six months but informed me that none had benefited her.

The woman was of very cleanly habits and felt much mortified about her condition. There was so much serum oozing from the skin that her clothing was always soiled. The itching and burning was such that she could not rest at night. From her statements I ascertained approximately what local treatments had been employed and from the results obtained, felt that to continue local treatment would be of no avail. Staphylococcus aureus and albus mixed stock vaccine—200,000,000 of each organism—was resorted to and all local treatment discontinued. In two days she felt much better, the itching and burning diminishing. By the sixth day when the dose of vaccine was repeated the skin had dried up and was healing. I told her to return for a third inoculation in a week, but she felt so well she did not return—for several weeks, when she came to pay her bill. By that time the skin had entirely cleared up and about two years later when

I saw her again none of the trouble had reappeared. In this case evidently the immunizing powers against the staphylococcus were not adequate until they were raised by the stimulating influence of the vaccine and, when once actively established, became permanent.

The results, in my experience, with the treatment of acute and subacute eczema of the moist variety have been uniformly good with staphylococcus stock vaccine. Two hundred million each of staphylococcus aureus and albus is given for the first inoculation and subsequently increased if necessary. Inoculations are made at four to six days apart. Usually four to six doses are sufficient, but in two cases which came under my care ten doses were given before a cure was effected.

I have used both stock and autogenous staphylococcus vaccine in chronic eczema with temporary results in some cases but the trouble would relapse after discontinuing the vaccine. In some instances the case would improve and then get worse again while under treatment. The use of small and large doses at long and short intervals made no material difference in the results. In cases where autogenous vaccines were used the dose was gradually increased until 2,000,000,000 germs were given.

Four cases of psoriasis were treated with staphylococcus vaccine prepared from staphylococci isolated from the skin lesions without beneficial results. At times there would seem to be

an improvement, but it was not permanent. Large and small doses at varied intervals were used with practically the same results.

FURUNCULOSIS.

In furunculosis, boils and carbuncles we have deep-seated localized infections of the skin caused by staphylococci, usually the yellow variety. From my experience these cases have always responded favorably to staphylococcus vaccine. As a rule the acute inflammation and pain begins to subside within twenty-four hours after the first inoculation. If necrotic tissue or pus has been formed before giving the vaccine the abscess should be opened, but where the vaccine is given early almost invariably the inflammatory process will subside without pus formation. This is very nicely illustrated in cases where furuncles in various stages of development exist at the time when the vaccine is given.

Allen (*Vaccine Therapy*, Third Edition, p. 92) sums up his own experience and that of others as follows: "The results recorded by many observers in boils and carbuncles, of which the greater proportion are due to aureus, have been uniformly good. Thus, Whitfield says: 'In all the cases of furunculosis which I have treated I have obtained complete, and up to the present, durable success.' Western: 'Nine cases of furunculosis were treated with aureus vaccine, in every instance with completely satisfactory results. All the cases of

carbuncle were ones which, in spite of incision, fomentations, and local antiseptics, showed no adequate attempt to repair or healing, yet all made rapid recovery.' Hartwell and Lee draw the following conclusions from their results in 100 cases of 'aureus' infections: 'Treatment with vaccines is the most effectual treatment for boils and carbuncle. There is marked diminution in the pain and tenderness. After twenty-four hours there is a profuse discharge, which continues till the focus clears up. With boils about the face, the especial value of the treatment is the prevention of scarring. Although the vaccine treatment does not prevent recurrence, cases of chronic furunculosis can be absolutely controlled by occasional inoculation.' The initial dose is from 100,000,000 to 250,000,000."

Dr. W. H. Watters (*New England Medical Gazette*, Jan., 1912, p. 14) says: "Probably of all diseased states treated by this new method, no one has given so uniformly successful results as has furunculosis, not only in abating the severity of individual abscesses, but in eradicating the tendencies toward remissions or recurrences. So true is this that I do not look for criticism from any source from the sincerely believed statement that vaccine should be given preference over all other therapeutic measures in every case of furunculosis, using various adjuvants, surgical or otherwise, only as the individual needs seem to require."

Ross cites a case: (*Journal A. M. A.*, Oct. 12,

1907, p. 1246) "The patient was a laborer of 45 who had a carbuncle on his back as large as a baby's fist. Inoculation with 300,000,000 staphylococci removed all pain and tenderness in forty-eight hours, the central slough came away in eight days and almost all of the inflammatory mass was dissipated a week later."

Gilchrist (**Congress of American Physicians and Surgeons**, 1910, p. 165) says: "The staphylococcus aureus vaccine was used at first on furunculosis with beneficial and curative results to prevent relapses, but if a boil had formed, and especially with a necrotic plug, this had to be treated locally as well. I found later that the staphylococcus albus vaccine acted just as well as the staphylococcus aureus vaccine for furunculosis. About twelve patients were treated with the former vaccine and all were cured with the aid of this mode of treatment. Some cases had received local treatment and kept relapsing, and it was noticed that the use of vaccine stopped the relapses."

I usually start treatment with 200,000,000 each of staphylococcus aureus and albus making inoculations at three to five-day intervals. After the second or third inoculation the dose should be increased to 300,000,000 or 400,000,000. In some cases it is necessary to give even larger doses. It is always advisable to give several large doses at one-week intervals after the furuncles have subsided to make the results more permanent.

ACNE.

Acne divides itself into two classes of cases. The pustular form in which the pustules are superficial, and the nodular form, in which comedones predominate.

In the pustular variety the staphylococcus albus is the chief infecting organism and in this class of cases good results are being obtained with staphylococcus vaccine. In treating these cases local treatment of the skin should not be neglected. Where deep-seated pustules exist they should be lanced with a cataract knife and the pus evacuated and local antiseptics should also be employed to take care of the surface infections. Either the staphylococcus albus or a combination of staphylococcus aureus and albus may be used. The dose varies from 200,000,000 to 600,000,000 and inoculations may be made at from three to seven-day intervals. In most cases it is advisable to start with the smaller dose and work up to the larger.

In acne vulgaris of the nodular variety where the skin is filled with comedones the acne bacillus is regarded as the chief pathogenic factor. Gilchrist (**Congress of American Physicians and Surgeons**, 1910, pp. 172, 175, 176) was the first to describe this organism and to give a better understanding of this I will quote extensively from his report: "In 1899 I found a bacillus, which I named *Bacillus Acnes*, in acne in ninety-six pustules and nodular lesions from fifty-five patients

and obtained eleven pure cultures of bacillus acnes on glycerine agar. I proved that this bacillus was pathogenic in animals from which pure cultures of the organisms were again obtained. During the period of that work there was no difficulty in growing the bacilli on ordinary glycerine agar. In 1903 I confirmed my previous work by finding the bacillus acnes present in 240 smears from eighty-six patients and pure cultures of bacillus acnes were obtained from sixty-two lesions. Sections showed that nodular acne was a giant cell granuloma and clumps of bacilli were found in the section stained by Gram's stain. I also found that the sera of patients suffering from severe acne caused clumping or agglutination of the bacillus acnes, even when diluted 1-100 and 1-200, which caused me to think that the anemia, coated tongue and constipation probably were the result of acne and not predisposing causes of acne. Others have confirmed my observation, notably Engman of St. Louis, Fleming and Western of England, and others. Fleming of London, as well as myself, has noticed that when too much vaccine is used a 'flaring up' of acne nodules appears after a few days and pure cultures of bacillus acnes can be obtained from them. This is a further proof that the bacillus acnes is the cause of acne, being similar in principle to the tuberculin test. . . .

"As the result of my experience with the treatment of acne during the last three years, I should say that vaccine therapy is of undoubted value,

and in many cases curative. Of the vaccines to be used the staphylococcus albus vaccine is very helpful in cases of superficial pustular type—that is, when the staphylococcus albus as a secondary invader predominates—but where the nodular variety is present, then the bacillus acnes vaccine is the proper remedy to use. One would be apt to conclude from this, then, that mixed vaccines would be the ideal treatment. Even with vaccine therapy some cases are apt to relapse, because I think the patient's general condition is apt to relapse and so present favorable soil for the organism to proliferate again and cause new lesions. The bacillus acnes is normally present in the skin and waits for an opportunity to grow, and since some patients are far more susceptible than others, the relapses more often occur in those cases. I recommend the dose to be given at first to be about three to five millions, then gradually increase each week, but if new nodules appear three days after the injection then too much vaccine is being given. A great many of my patients were rid of their acne after seven to ten injections.

“In patients who have no acne lesion, but who in young adult life have over nose and cheeks numerous patulous openings out of which can be expressed thorny plugs or comedones, this bacillus acnes vaccine has been used with some success, but all the comedones must be expressed first. The vaccine has no effect whatever on comedones. One patient, a physician, has improved so much that he

considers himself cured. *Bacillus acnes vaccines* had also a beneficial effect on the oily seborrhoea which accompanied the presence of acne, but its results were not as good as the application of X-Ray."

The acne bacillus at best is a very slow grower. In my laboratory two per cent. glucose agar has given the best results, especially if the cultures were kept under anaerobic conditions. When inoculating glucose agar for surface growth I find it necessary to make heavy plantings. If the organisms are scattered they are liable to die.

The staphylococcus being always a complicating organism in these cases of acne, acne bacillus and staphylococcus combined vaccine is advantageously used. In the administration of this vaccine, dosage is a very important consideration, because with this organism Wright's negative phase is pronounced when too large a dose is given. Treatment should be started with 3,000,000 increasing gradually at four to six day intervals as indicated by the results obtained. A day or two after an inoculation, a few new lesions usually appear; if more than four or five such lesions should develop, the dose has been too large. It is better to give smaller doses at four-day intervals, than large doses further apart. To avoid auto-inoculations violent manipulation of the skin should not be resorted to on the day of treatment. Local attention to the lesions, however, is very essential to obtain the best results. On the third or fourth day,

when the immunizing influence is at its height, all pustules and indurated lesions should be lanced with a cataract knife, and the contents pressed out. Hot water applications to stimulate the skin circulation, and other suitable local treatments may be employed to advantage.

URTICARIA.

It has long been known that certain kinds of skin ailments are associated with digestive disturbances. This is especially noticeable in some forms of urticaria. Dr. A. E. Owens of Princeton, Illinois, in a private communication relates the following interesting case:

The case had been running for about three months, being constantly under the care of a physician and having experienced no relief from the trouble, in her discouragement, had decided upon a trip to the Carlsbad Springs. The patient made a visit to our town before taking her expected departure and upon her arrival she suffered an unusually severe attack and I was called to try to give her some temporary relief. Upon being informed by her of the men who had had her case in charge, and of the methods they had employed, I decided that nothing that I could do in the way of drug or dietetic treatment would bring her more relief than she had already received. I suggested to the patient that it was probably a case of colon bacteriemia and urged the use of colon bacillus vaccine. She was ready to accept any treatment that

would at all promise relief. I gave her at once 40,000,000 colon bacillus vaccine with the result (this being in the evening) that the next day she experienced very little trouble from her disorder. This initial dose was followed in three days by a second dose of like size with the result that on the following day her trouble had practically disappeared. She was then obliged to return to her home in Chicago and requested that I give her a prescription for the vaccine that her physician might follow the treatment for a time and this was done. Unfortunately the dose that was given seven days after the second dose by her home physician, contained 100,000,000 bacilli. This dose produced an over-stimulation with the result that on the following day she had a return of her trouble in a most aggravated form. The symptoms, however, subsided on the following day and up to this time, now about four months, there has been no return of the trouble.



CHAPTER XXXI.

Some Experiences With Vertigo.

EXTENSIVE RESEARCH into the cause of vertigo has been conducted by investigators abroad and in this country during the last few years. That the cause of this disagreeable ailment has been traced to disturbances in the internal ear is indicated in an exhaustive article by Dr. George E. Davis who concludes:

“The internal ears are the special sense organs of equilibrium. With the internal ears we recognize (orientation) and maintain our relations to space (equilibration).

“The visual sense organs (the eyes), and the kinesthetic sense organs (the muscles, etc.), are accessory sense organs of equilibrium (the internal ears), through the mediation of the cerebellum.

“The two special sense organs of equilibrium (the internal ear on either side), are normally symmetrical in structure and function, and any factor whatever, whether it be physiologic, experimental or pathologic, which innervates, stimulates or irritates one of these twin organs in excess of the other (or on the other hand accomplishes the same thing through enervation, depression or destruction of one in excess of the other), in that measure tends to or creates proportionately a disturbance

of equilibration sufficiently marked or intense that we also get nystagmus and that unpleasant and complex phenomenon termed vertigo."

Dr. Edward Bradford Dench (**New York Medical Journal**, Jan. 6, 1912, p. 1) reports a number of cases of vertigo treated by operation and other methods, and among other things says:

"As the end organ of the complex mechanism controlling the equilibrium of the body, is situated in the semicircular canals, all cases of vertigo must, in their broadest sense, be considered as aural vertigo, inasmuch as they represent an involvement either of the ear itself or of some portion of the auditory nerve trunk or of its central or cortical filaments."

"We may classify cases of this disease as follows:

"1. Cases due to a chronic non-suppurative inflammation of the middle ear.

"2. Cases due to a residual suppuration of the middle ear.

"3. Cases due to aural suppuration.

"4. Cases due to involvement of the auditory nerve trunk, as the result either of a specific inflammation involving the nerve trunk, or due to a degeneration of the end-organ of the auditory nerve as the result of some middle ear inflammation or of some general diathetic condition.

"It should be borne in mind that when any portion of the auditory apparatus, either of the middle ear, the labyrinth, or the nerve trunk, is in

a pathological condition, any slight stimulus, particularly an increase in the blood pressure, may be sufficient to bring on an attack of vertigo."

I will briefly review his cases because they are specially instructive in showing the relation of inflammatory processes of the aural mechanism to the production of vertigo.

Case 1. Non-suppurative otitis media with tinnitus was successfully treated with a two per cent. solution of pilocarpin introduced into the tympanic cavity through an Eustachian catheter.

Case 2. Another case of chronic non-suppurative otitis media with progressive sclerotic changes within the middle ear and labyrinth was treated by opening the vestibule with a small knife and allowing a certain amount of the labyrinthine fluid to escape. This aggravated the vertigo for a time but the condition gradually subsided and finally recovered.

Case 3. One case of grippe was followed by acute otitis media with mastoid involvement which was operated upon six weeks after the initial attack. A month after the mastoid operation severe vertigo suddenly developed. The acute symptom subsided but a slight vertigo remained, and two months later a radical operation was performed relieving a fistula in the horizontal semicircular canal. Drainage was instituted and the patient made a complete recovery.

Case 4. This was a case of perilabyrinthitis with vertigo and was almost entirely deaf. As no

fistulous opening into the labyrinth was found, the radical operation was performed and primary grafting employed. The patient made a good recovery.

Case 5. This case gave a syphilitic history. The patient complained of hardness of hearing with vertigo. He was given large doses of salicylate of mercury and began to improve at once under this treatment and completely recovered. In some special remarks on this case the author says: "In this case we had to deal undoubtedly with a syphilitic inflammation, either of the auditory nerve trunk itself or of the meninges in the immediate neighborhood of the internal auditory meatus." The complete recovery of the patient confirms the correctness of the diagnosis.

Case 6. This man showed involvement of the auditory nerve trunk with severe tinnitus and some vertigo. Operation of dividing the auditory nerve at its emergence from the base of the brain was performed, and the patient was absolutely relieved for a number of months. There was some slight return of the tinnitus, but the other conditions remained good.

These cases show that a large variety of inflammatory conditions in and around the internal ear may be responsible for the single symptom of vertigo. In cases 3 and 4 operations were performed for the purpose of establishing drainage but unfortunately no report of bacterial findings

was made to show the etiological cause of the inflammatory condition.

The syphilitic case demonstrates that a specific causative organism—the spirochete—may be responsible for an inflammatory process that will subside under specific treatment, with a resultant disappearance of the vertigo.

Putnam (*Therapeutic Gazette*, Feb. 15, 1912, p. 119, review *Boston Medical and Surgical Journal*, Sept. 28, 1911) says:

“The functional efficiency of the apparatus of which these canals are an essential part may be impaired, even though the cochlea and auditory apparatus are in a normal state, so that tests for hearing are an insufficient guide in the determination of the labyrinthine condition in cases of aural vertigo.”

It is now quite generally admitted that aural vertigo is associated with some inflammatory condition connected with the semicircular canal and that this inflammation may be acute, subacute or chronic. It is also found that when such inflammation exists, variations in blood pressure have a great influence on the vertiginous attacks, causing them more frequently when the blood pressure is high than when it is low. This would indicate that in cases of arteriosclerosis the attacks of vertigo are due primarily to an inflammatory condition of the aural apparatus while ordinarily they are attributed to the sclerotic condition.

Cases of vertigo associated with suppurative

and nonsuppurative otitis media are commonly met with. Bacterial examinations of the pus in the early stages of this disease show that in a large majority of these cases the streptococcus is the primary infecting organism. After a rupture of the ear drum, outside contamination soon takes place and staphylococci are found. Later they often supplant the streptococcus. From clinical observations we find that the streptococcus is an organism that may cause an almost endless variety of inflammation and many kinds of tissue may be involved.

I have seen cases of chronic erysipelas where the inflammatory process was practically the same for months. Chronic rheumatic joints are good illustrations of persistent infective processes without pus formation. As streptococcus infections are of such common occurrence in middle ear inflammations, the inflammatory processes associated with vertigo can very readily be attributed to this organism.

In chronic nonsuppurative otitis we have a subdued inflammation associated with inflammatory deposits and adhesions. This condition often extends into the bony structure around the semi-circular canals without pus formation. This is quite similar to the condition in the bony structure of enlarged joints in chronic rheumatism. From our present knowledge of germs and their relation to inflammatory processes, the inference is conclusive that the inflammatory process in

these cases of vertigo is due to an infecting organism. It seems entirely probable that the streptococcus is responsible for many of the conditions which produce vertigo. Streptococcus vaccine is the specific for streptococcus infections and my experience which now includes the successful treatment of twenty cases of aural vertigo with this vaccine, seems to conclusively show that this inference is well sustained.

A somewhat detailed report of several of these cases will be of particular interest as the subject is barely mentioned in present day medical literature.

Case 1. A man called at my office for treatment. He was tall, well developed, and appeared in good health, but complained of persistent attacks of vertigo. This condition was steadily growing worse, although he had been under the care of one of the best physicians in Detroit for four months. He was a foreman in a pattern shop, and found it difficult to walk about to attend to his work. No well-defined reason for the vertigo could be found. There was no tinnitus and hearing was normal. The ear drums were also normal. On careful investigation I realized that by giving medicines probably nothing more would be accomplished than by the previous treatments. Shortly prior to that time I had treated a case of nasal catarrh with streptococcus vaccine in which a peculiar dizziness or "nervous dancing of objects," as the patient described it, was incidentally completely relieved.

From this clue I decided to treat the case empirically with streptococcus vaccine, giving 300,000,000 with each inoculation at seven-day intervals. After the second dose he was much improved. Treatment was continued for two months, and a complete cure was effected. It is now nearly five years since treatment was started and the vertigo has not returned.

Case 2. A man working in the dynamo room of a large power plant would be seized with spells of vertigo sufficiently severe to cause him to fall to the floor. He had been treated by several physicians, but was steadily growing worse. His hearing was good, but he complained of tinnitus in one ear. Four doses of streptococcus vaccine at intervals of one week effected a cure. A year later the vertigo returned. This time it required six doses to effect a cure. About fourteen months after the second attack, the vertigo returned again when but two doses of streptococcus vaccine were required. It is now ten months since the last treatment, with no return of the vertigo.

Case 3. I was called to treat an old lady having vertigo with a vaso-motor disturbance which caused the skin to become markedly flushed. The vertigo was persistent whether walking or lying down, and was so severe that she could not walk across the room unaided. This condition existed for some months. I persuaded her to allow me to treat her with vaccines. When I called to give her the third dose she sat in the hall at the open door.

Expressing my surprise at seeing her there, I asked how she got downstairs. She informed me that she walked down alone and in my presence she walked up stairs to her room alone. The improvement in her vertigo was remarkable. She very much disliked hypodermic injections, but I managed to get her to take the third dose. I have since lost track of her and am unable to say how she is now.

Case 4. A young woman with previous good health had been under treatment by a physician for seven months for vertigo and other disturbances that went with it. She had some neuralgic pain on the left side below the heart. The appetite was poor and she had lost twenty pounds in weight, weighing at the first visit to my office 108 pounds. She described the sensation as being similar to that of riding in a small boat on rough, rolling water. The vertigo improved steadily after using the streptococcus vaccine and after taking ten doses she was entirely restored to health. Her last inoculation was given eighteen months ago and the vertigo has not returned.

Case 5. A middle aged man employed as a wagon maker complained of vertigo of six weeks' standing with tinnitus in the right ear. The vertigo entirely subsided after the sixth inoculation of vaccine.

Case 6. A middle aged lady complained of tinnitus in the ear with vertigo and difficulty of hearing. This condition had existed for about

three weeks. After three inoculations her vertigo disappeared and the hearing was materially improved.

Case 7. A man employed as chief electrician in a large power plant consulted me concerning a vertigo of five months' standing. He described his condition as "feeling about half drunk all the time." There was no apparent ailment that the condition could be ascribed to. Hearing was normal and the habits were good and regular. I gave him inoculations of streptococcus vaccine at seven-day intervals. He began to improve after the first inoculation and was completely cured after five doses. It is now nearly three years since the last treatment with no return of the vertigo.

Case 8. A middle aged man who had charge of the power plant in a large manufacturing establishment, after a bad cold, had some pain in his ears with a fullness in the head. Hearing was somewhat impaired and vertigo was almost constant. This had been going on for four weeks. Streptococcus vaccine was employed and four doses were given from five to seven days apart. Improvement was observed after the first inoculation, and the man made a complete recovery. As one of the members of the family was sick with tuberculosis, I had occasion to see the man frequently and he assured me that there was not the slightest return of the vertigo.

Case 9. An elderly lady complained of being almost deaf for about one week. She also was

troubled with several attacks of vertigo. Examination showed that the hearing was almost entirely gone in the right ear and she could only hear loud conversation with the left. There was no pain or apparent inflammation in either ear. Streptococcus vaccine was given for the first dose and a streptococcus-staphylococcus combined vaccine was given a week later. Two weeks after the first inoculation when the third dose of the combined vaccine was given the vertigo had left her, but her hearing was not improved. I have lost track of her and do not know what the ultimate result was.

Case 10. A young woman of twenty-nine had suffered with repeated attacks of vertigo for four months. Hearing was normal. There was some digestive disturbance and the question as to whether or not the vertigo was due to nausea was carefully considered. I found that it was not. In consideration of the digestive disturbances I gave her a combined colon bacillus and streptococcus vaccine. Six doses at weekly intervals effected an entire cure.

Case 11. This was a man 74 years old with marked arterial sclerosis. Attacks of vertigo would come on at intervals several times a day with great severity. During these attacks he was obliged to sit down or take hold of some object to keep from falling. His hearing was somewhat impaired but he could hear a loud conversation quite well. His general health was run down and he

had in a degree lost control of co-ordinating the legs while walking. Streptococcus-staphylococcus combined vaccine was given at from five to seven-day intervals. He had a single attack of vertigo after the first inoculation. I gave him altogether ten doses with the idea of procuring the tonic effect of the vaccine. (See Chapter XXVII.) His general health improved some but the treatment was discontinued. So far as I know the vertigo has not returned.

Case 12. An apparently well-preserved old lady complained of severe tinnitus, taking on the form of music and imaginary people talking to her. This annoyed her so that she could not secure proper sleep. Her hearing was fairly good. The vertigo was quite severe. I gave her seven doses of combined streptococcus-staphylococcus vaccine. Her vertigo soon left her after using the vaccine and the tinnitus became some better but is still troubling her.

Case 13. Man with vertigo of two years' standing. Tinnitus in both ears. Hearing normal. Three doses of streptococcus at weekly intervals relieved him of his vertigo but the tinnitus was not materially improved.

Case 14. A case of chronic nonsuppurative otitis with tinnitus in both ears. Can only hear loud conversation and has been suffering with a vertigo which came on gradually for some time. The patient also had some bronchial trouble at the same time. I administered seven doses of strep-

tococcus-staphylococcus-pneumococcus combined vaccine at about weekly intervals. The vertigo subsided soon after using the vaccine and tinnitus and hearing improved. Two months after receiving the last dose she returned, complaining of some dizziness. I started the vaccine treatment again and the vertigo subsided after the first inoculation. The case is still under treatment.

Case 15. Chronic nonsuppurative otitis in a man of sixty with vertigo of seven years' standing. At first the vertigo was intermittent, but for the past year it has been almost constant. He reports that some days the vertigo was so bad that he was obliged to sit in a chair all day. The hearing is such that conversation can be carried on with a moderately loud voice. The vertigo began to improve after the first inoculation of streptococcus vaccine and after the third dose it had entirely left him. I have so far given eight doses but treatment is still being continued with the hope of possibly improving the hearing a little more.

Case 16. Chronic nonsuppurative otitis media with tinnitus and vertigo of four years' standing. During the week prior to the time he first consulted me the vertigo was especially bad. Some days he was obliged to stay at home. The hearing is fair, he can hear a watch tick two inches from the right ear and five inches from the left ear. I started treatment with streptococcus vaccine. Improvement was observed after the first dose and after the third inoculation there was no more ver-

tigo. So far only five inoculations have been made. On account of a concomitant nasal catarrh, the last two inoculations consisted of a combined streptococcus-pneumococcus-staphylococcus vaccine. He is encouraged and still under treatment.

Case 17. A case of chronic nonsuppurative otitis media in a woman with vertigo of over a year's standing and tinnitus in both ears. Cannot hear a watch tick next to the ear. Bone conduction poor. Has so far received three inoculations of combined streptococcus and staphylococcus vaccine. The vertigo has almost entirely left her, but the other conditions are about the same, and she is still under treatment.

Four other cases of vertigo were successfully treated the details of which would not materially add to what has been said in my other cases.

Dr. Harold Payne Lawrence of Pinconning, Mich., courteously reports the following case: "Mr. D. age 48, musician, consulted me in regard to case of vertigo to which he had been subject for one and a half years. A number of internists had diagnosed his trouble as auto-intoxication, but the treatment was of no avail. I also diagnosed his trouble likewise, but failed to benefit him. He then told me he suffered from a running ear several years ago and that naturally drew my attention to the chronic affections of the middle ear. I then thought of a possible infection of the semicircular canals (for which I wish to give thanks to Dr. Emil Amberg of Detroit, who gave me several

valuable hints on the subject). He was injected with the streptococcus vaccine, 60,000,000 every seven days for five weeks and showed improvement. I was not thoroughly satisfied that the staphylococcus was not also present, so I used combined streptococcus and staphylococcus for six weeks. His trouble has entirely subsided, but he is still under treatment."

The successful treatment of vertigo with vaccine is one more illustration of the very wide scope and real therapeutic advantage of vaccine therapy. In these cases the inflammation is deep-seated in such a position that local antiseptic treatment is practically impossible and operative interference is always a serious procedure. By this simple process of immunizing the patient, the trouble may be reached in any part of the body, and if it should be supposed by some that the results referred to here are only temporary (in spite of the fact that years have passed in several of the cases) it is at least uncontroversial that results have been secured even though the skeptic desires to call them "temporary"—the patients are pleased!

CHAPTER XXXII.

Bacillus Pyocyaneus Infections.

BACILLUS PYOCYANEUS INFECTIONS are not of every-day occurrence but are sufficiently often met to deserve consideration. The organism is most frequently found as a secondary invader in chronic ulcers and more particularly in cases of chronic suppurative otitis media. In occasional instances it appears to be the principal infecting organism. Allen reports a case of hip-joint disease in which the organism was procured in pure culture six weeks after operation. There was much fever accompanied by other constitutional disturbances. This subsided promptly after using an autogenous vaccine and all the abscesses and sinuses healed except one quite small superficial one.

When the bacillus pyocyaneus is found as a secondary invader where other pus organisms are present, its pathogenic influence is not well established. Some observers contend that in such cases it simply acts as a scavenger while others attach some importance to it. I have used bacillus pyocyaneus vaccine without any results, especially in middle-ear cases. I find that by using vaccines for other organisms, local antiseptics usually will take care of the pyocyaneus infection.

In one case of chronic bronchitis associated with severe attacks of asthma I found almost a pure culture of bacillus pyocyaneus. A vaccine was prepared from the organism and doses of 100,000,000 combined with 30,000,000 streptococcus was given at weekly intervals. Improvement was observed after the third inoculation and after fourteen doses the patient was entirely well.

In one case of neuritis associated with some cystitis the bacillus pyocyaneus was found in the urine. A vaccine was prepared but no benefit was obtained from its administration.

A large variety of opinions exist as to the value of pyocyaneus vaccine. Some consider the vaccine of value while others think it is useless.

Dr. Nathaniel Gildersleeve (*Journal A. M. A.*, July, 1911, p. 286) in an attempt to arrive at some definite conclusions, made an extensive investigation with various strains of the organism both experimentally and clinically. His work is particularly valuable. He says:

“There is no doubt of the fact that, experimentally, there is a marked increase in the opsonins and agglutinins produced by immunization, not only with the living organisms, but with the vaccine as well; this point, coupled with the fact that the leukocytes, not only in the peritoneal cavity but also subcutaneously, exert a marked phagocytic action, leads one to consider that opsonic immunity is of much more import in connection with pyocyaneus infections than has been at-

tributed to it up to date. This being the case, it might be expected that vaccine would be the rational agent in treating infections produced by the organism under consideration. When one considers the toxic substances produced, however, and the fact that the immunity is composite, in which at least three elements enter (antitoxins, agglutinins, opsonins), with evidence furnished by some in favor of a fourth (bacteriolysins), one may hesitate in expressing an opinion. It would seem that, even in local infections, the vaccine would not bring about sufficient stimulation of one or two properties (agglutinins and opsonins) to overcome, not only the organisms, but the effects of their toxins, which we cannot hope to render inert by injecting vaccine into the tissues. This toxin is evidently an important factor in pyocyanus infections. Active antitoxic sera have been produced, and it would appear that the rational procedure would be to employ such serums in conjunction with vaccine; but here difficulties arise, which so far have interfered with the production of antitoxic serum in sufficient quantities to be of value as a therapeutic agent.

“The fact that the vaccine will not regularly exert a curative action on infected rabbits is noteworthy, but must not be considered as a condemnation of these substances; that they do exert such an action to some extent in local infections is important. The fact that they have apparently no curative action when the organisms are injected

into the peritoneal cavity and circulation only bears out what seems to be the opinion of the majority regarding the bacterial vaccines in general; i. e., that their value in the treatment of general infections is limited.* I saw no evidence in animals suffering from a general infection that could lead to the conclusion that the vaccine had exerted a detrimental influence. As the course of such infections may be hastened by the injection of a very small amount of toxin, vaccines should be employed with care. They should be prepared from twenty-four hour agar cultures, freed from pyocyanin and any toxin by washing in salt solution, centrifugalizing, and utilizing the sedimental bacteria in preparing the vaccine. If such vaccine be employed it should always be prepared from the strain of the organism causing the infection, as not only should those possessing no virulence when isolated be avoided, but also those in which the virulence has been reduced by continuous existence on artificial media.

“Summary of Results and Conclusions:

“1. A marked increase in both the opsonic and agglutinative elements can be induced in the animal economy by the injection of vaccine as well as living organisms. Therefore, employment of vaccine in treatment of local pyocyanous infections would appear rational.

“2. However, there is also a toxin produced by the organism under consideration, the action

* Here I beg to differ with Doctor Gildersleeve.

of which manifestly cannot be counteracted by the use of the medicine.

"3. Should one decide to employ vaccine in treating these infections, such vaccine must be prepared from the organism concerned in the individual infection under treatment, and never from strains that have been cultivated on artificial media for a number of generations. These organisms soon lose their virulence under artificial cultivation and at the same time, at least to a great extent, their power of conferring immunity.

"4. Bacteriolytic elements could not be demonstrated *in vitro* under either aerobic or anaerobic conditions.

"5. The phenomena appearing in the peritoneal cavity of guinea-pigs and rabbits, following the injection of the organisms, are apparently essentially agglutinative and opsonic (phagocytic) but little evidence presented to confirm the statement to the effect that there is an active bacteriolysis.

"6. Old toxic filtrates or extracts from the cells produce little or no increase in the agglutinative and opsonic functions; but the toxic filtrates do produce a high degree of immunity against such filtrates."



CHAPTER XXXIII.

Pyorrhea Alveolaris.

OF LATE much attention has been directed towards the bacteriology and vaccine treatment of pyorrhea alveolaris, a most intractable and disagreeable condition which does not always respond to conventional treatment.

Bacterial research by Goadby (*Lancet*, Dec., 1909, p. 1875) Eyre and Payne (Odontological Section of the Royal Society of Medicine, Nov. 22, 1909), Allen (Vaccine Therapy, Third Edition, p. 266) E. S. Talbot (*Journal A. M. A.*, Feb. 10, 1912, p. 401), and others shows that a variety of organisms is responsible for this condition. The streptococcus, staphylococcus, micrococcus catarhalis and pneumococcus are in all probability the principal infecting organisms. In some cases the infection may be due to one organism but more frequently a mixed infection of two or more organisms is found. From the experience of Dr. Geo. B. Harris, D. D. S., of Detroit (paper read before Second District Dental Society, Oct., 1911), it appears that the staphylococcus is the most constant organism found. Allen says that in the later stages the pus organisms are often supplanted by the spirachetae and spirillae, broth cultures of which he contends are intensely toxic, and contain

an active hemolysin to which the anemia often associated with the disease is to be attributed.

Bacterial examinations in my experience show staphylococci and streptococci to be the most constant organisms present. In the early stages it is often difficult to procure a culture but this should not be considered proof that the inflamed condition of the interstitial tissues is not of infectious origin. Any one who has had an extensive experience in procuring cultures from inflamed tissues knows that it is no easy matter to obtain cultures where no actual suppuration exists. In the early stages of streptococcus infections where the process is slow this organism is especially difficult to procure, and to postpone vaccine treatment in such cases until the infection has progressed far enough to find the organism is not wise. Under such conditions vaccine therapy often furnishes a valuable aid in making a diagnosis. Where a persistent inflammatory condition exists, which subsides readily after using a streptococcus vaccine it is fair to assume that the inflammation was due to the streptococcus although the organism may not have been found.

In pyorrhea we have an infective process of the gum around the teeth and in the alveolar process in every possible stage of development from a slight inflammatory condition to a point where the alveolar process has been absorbed and the teeth must be removed. It may involve one tooth, a group of teeth, or all of them.

Often where the process is localized some mechanical hindrance such as bridging or improperly filled teeth, irritate the tissues and keep up a condition continually favorable to the infecting organisms. Improper care of the teeth with the accumulation of filthy concretions is often a predisposing irritating cause of the infection and must absolutely be taken care of.

Frequently, however, the inflammatory process starts around the roots of the teeth without any apparent predisposing cause. In these cases the infection is deep-seated and difficult to reach with local treatment, especially before there is pus formation. It is in the early stages of the infection, before the alveolar process has become softened that the vaccine treatment can be used to the best advantage. A bacterial diagnosis often not being available in the early stages, a combined stock streptococcus-staphylococcus-pneumococcus vaccine is used to advantage. If the disease occurs in cases associated with chronic catarrh, the micrococcus catarrhalis vaccine may be used. Inoculations should be made about 4 or 5 days apart and continued at longer intervals for a month or more after the inflammatory condition has subsided in order to insure a permanency to the results.

In the more advanced cases where pus formation has taken place, careful bacterial examinations should be made to determine the infecting organisms and corresponding stock vaccines used. Where prompt improvement is not observed with

stock vaccines autogenous vaccines should be prepared. Appropriate local treatment should also be employed in conjunction with vaccines.

There has been much said and written about the predisposing constitutional causes of this disease, such as anemia, general debility, etc., but from what is known about infectious diseases it is fair to assume that these conditions may be due to toxic materials absorbed into the system from the infected alveolar tissues.

Staphylococcus and streptococcus infections due to decayed teeth causing extensive swelling and often abscesses are also frequently met with. Many dentists hesitate to extract teeth where there is an acute inflammatory condition with much pain. Combined streptococcus and staphylococcus vaccine is of great value here. I have seen some of those acute painful inflammations subside within twelve hours after an inoculation. If the vaccine is used early abscess formation can be avoided.

Dentists who have used bacterial vaccines in the treatment of infections of the antrum of Highmore, are enthusiastic about the convenience of this method. Not only is vaccine therapy convenient in the treatment of such hard-to-get-at infections but the results obtainable are usually a surprise to the dentist who has accustomed himself to the tedious douching, medicating and packing in general use.

From our present knowledge regarding the prophylactic value of vaccines in surgery there is no good reason to doubt that vaccines would be a very valuable adjunct to local treatment in procuring rapid healing of the gums after teeth extractions. The lacerated tissues from teeth extractions present a good field for infective processes and in many cases quite extensive infective processes take place. By giving vaccines after extracting the teeth in every case this painful inflammatory condition could be avoided.



CHAPTER XXXIV.

Vaccines in Cerebro-Spinal Meningitis.

MUCH INTEREST has been evinced in this country in this dread disease by the appearance of a wide-spread and quite fatal epidemic in many towns in Texas.

The applicability of vaccines in the treatment of this condition is still a moot question, for unfortunately, as many physicians have found out to their sorrow, the onset of cerebro-spinal meningitis is so sudden and the results of the infection so masked until they are beyond control, that to administer a vaccine in the treatment of this disease with the expectation of satisfactorily stimulating the immunizing response, would be practically useless. If such a response can be stimulated early—before the intoxication is so marked—then this method of treatment would be extremely valuable. So at present the widest field of usefulness for a vaccine made from the meningococcus, is in prophylactic work.

Before we come to the discussion of the use of vaccines in prophylaxis, the matter of their influence in the more rare chronic cases of cerebro-spinal meningitis is in place. In spite of the large number of acute cases, very rarely do they become

chronic, for the patients either die or get well. However, the occasional chronic case is a good subject for vaccine therapy, and the possibilities for successfully remedying the after-results in such cases are very much greater with vaccine therapy than without it.

By far the greatest field of usefulness for vaccine therapy in meningitis is as a prophylactor. Just as inoculations of killed typhoid bacilli have proved so widely useful in the prevention of typhoid fever, so, on the same fundamental basis, injections of the meningococcus give an immunity against the diplococcus intracellularis meningitidis of Weichselbaum. A number of physicians in Texas, notably Dr. A. E. Thayer, of Dallas, have proved to their satisfaction the prophylactic value of injections of meningococcus vaccine before patient is infected. From the experiences gained thus far, it has been proved that the large majority of those thus immunized do not become infected when exposed to the disease. The use of this vaccine also shortens the convalescence and materially lessens possibility of the serious complications which are liable to show themselves when the attack of meningitis passes into the chronic stage and the serum treatment ceases to be effective.

Meningococcus vaccine, as in the administration of typhoid vaccine for immunizing purposes, is given in three separate doses at intervals of five

to seven days. From 250,000,000 to 500,000,000 killed germs are administered in the usual manner. The reaction, like that in anti-typhoid inoculations may cause slight local pain and a passing malaise. If these conditions have all disappeared, the second dose of 500,000,00 to 750,000,000 is given between the fifth and seventh day. Usually the second dose causes a diminished reaction and sometimes no reaction at all. One week later a third dose of 1,000,000,000 completes the immunizing process.

The process of the establishment of an immunity to such serious infections as meningitis, typhoid, cholera, etc., is, in itself, a matter for more care than the therapeutic use of a bacterial vaccine. The doses are much larger and there is likely to be a little more reaction. If this reaction should happen to come concomitant with the initial stages of actual infection; (i. e. an injection made in the incubation stage of the disease) it is conceivable that such attempt at prophylaxis might be detrimental. For this reason those who have been brought into direct contact with the disease and in whom an infection is already suspected should be treated with smaller doses over a longer period of time. In such cases, I would advise an initial dose of 100 million followed in 3 or 4 days with 250 million and in 5 or 6 days with 500 million and a week later 750 or 1,000 million.

It may be well here to add a few words of a

precautionary nature, for as with the prophylactic treatment of typhoid with vaccines so here there may be a reaction following prophylactic inoculations of meningococcus vaccine. Usually there is a red, tender area around the site of the injection and occasionally the axillary glands became a little tender and there is an accompanying headache and feeling of malaise. Very rarely a case shows an idiosyncrasy to this treatment evidenced by an exaggeration of the above symptoms with nausea and slight vomiting. Herpes have been noted on the lips. It must be said, however, that these ill-effects are fleeting in character and no really bad results have ever been seen. It is not advisable to commence prophylactic treatment immediately before or during the menses.

I cannot too thoroughly emphasize the importance of appreciating the prophylactic powers of bacterial vaccines, not only in cerebrospinal meningitis, but in typhoid, scarlet fever, puerperal sepsis, post-operative infection, cholera and many other possible infections and infectious diseases. These various subjects are fully discussed under their respective titles.

For emphasis let me state that suspensions of killed meningococci must be considered a prophylactor par excellence, and should be used in every case that has been exposed to possible infection by this germ. Its use can do no harm, and while no one has claimed infallible powers for this

method, it is a tremendous step toward the final mastery of a very dangerous and fatal malady.

The serum treatment of epidemic meningitis is, of course, a little away from the scope of this book. However, it may be well to say that the tedious and persistent experiments of Dr. Simon Flexner and his assistants at the Rockefeller Institute in New York have given us a serum which is by far the most effective means of treatment as yet known. Its preparation is quite similar to that of other sera, as, for example, anti-diphtheric serum and anti-tetanic serum. Horses are carefully and gradually immunized by increasing doses of meningococcus until finally an immense dose can be given with impunity. The serum constitutes the remedy, and the method of procedure is to withdraw 15 or 20 cc. of spinal fluid, directly from the patient and immediately substitute in its place the same or a slightly smaller volume of the curative serum. This neutralizes in a large degree the toxicity of the spinal fluid and permits the body to reassert itself.

In this connection it may be well to quote from a report by Passed Assistant Surgeon W. H. Frost, published in **Public Health Reports**, No. 69: "The use of anti-meningococcus serum in the treatment of this disease may be now considered to have passed beyond the experimental stage and to have been established as a therapeutic measure of such well proven efficacy that its use becomes impera-

tive. Now that the serum may be obtained readily upon the market in this country, it becomes the duty of those who undertake to treat cerebrospinal meningitis to inform themselves as to the principles and methods involved in this therapy."

Further information on this subject may be secured from the annual reports of the Health Department of the City of Richmond, Va., for the year 1910 and from Ernest Levy's excellent article, "Serum Behandlung der Uebertragbaren Genickstarre," published in *Klinisches Jahrbuch*, June, 1911, Vol. XXV., pp. 121-272.

In closing, it should be emphasized that the addition of vaccine therapy as a compliment or adjuvant to the recognized curative treatment is by no means contra-indicated, and just as the progressive element in the profession are now treating diptheria first with antitoxin and then following up this treatment, with vaccine inoculations, so the serum for meningitis may advantageously be supplemented by vaccine therapy, the dosage being the same as that suggested above.



CHAPTER XXXV.

Miscellaneous Other Possibilities of Vaccine Therapy.

CHOLERA.

THE CHOLERA SPIRILLUM has been extensively studied by numerous investigators. The organism grows readily on ordinary culture media and is readily killed with the usual antiseptics. Drying kills the organism in about 2 hours and for this reason it is believed that the disease is never contracted by inhaling the germs in the form of dust. The usual source of infection is by drinking contaminated water or milk. The infection produced by the cholera spirillum is entirely local in the intestine, the organism never having been found in the blood. This germ possesses a powerful endotoxin and immunity is established by bacteriolysis. Allen (Vaccine Therapy, third edition, page 271) says "Kolle advises the use only of a vaccine of the fully virulent organisms, and finds that the local necrotic effects which were anticipated do not occur. He claims that more rapid immunity results. The full immunity from each inoculation is attained in about five days, so that it is complete in about ten days,

and is said to last for at least a year. The good results are seen in a reduction of the incidence of the disease, but not of the case mortality, which appears to be uninfluenced. This may be seen in the table given below which has been prepared from the recorded results from numerous sources spread over several years:

POPULATION	CASES	DEATHS	FATALITY
18,355	667-3.6%	393-2.1%	59%
12,744	84-0.66%	48-0.4%	57%

Fortunately in this country the incidence of cholera is extremely rare, a fact which is due undoubtedly to the extreme care taken at immigration ports and particularly at the Port of New York. Naturally, therefore, the study of this subject is limited to a study of the foreign literature. It has been proved, however, that a bacterial emulsion of cholera spirilli has valuable immunizing properties, thus adding an important weapon to the armamentarium of those who are called upon either to treat or prevent this terrible disease.

PLAGUE.

The bacillus pestus is now generally regarded as the pathogenic organism causing plague. The organism is described as a short plump bacillus with marked bipolar staining. When attempting to grow it in culture tubes it will be found that it grows better at room temperature than in an incu-

bator. It grows in delicate dew drop colonies on ordinary nutrient agar and does not curdle milk.

The tremendously fatal characteristics of epidemics caused by this organism, especially the historic Black Plague of the middle ages, is well known by all. From recent investigations it appears that the principal factor in communicating the disease is the flea of the rat. Rats are very susceptible to the disease. The fleas leave the dead rat and thus convey the disease to other rats or to man. On the Pacific coast, the ground squirrel has been infected and quite a number of cases of plague have developed among people hunting these squirrels.

In infected districts prophylactic vaccination according to Haffkine's methods has been successfully carried out. His preparation consists of a six-weeks broth culture of the organism. The growth is facilitated by having some oil drops on the broth made, which the germs grow and are shaken off from time to time. The broth is heated at 65 C. for an hour to kill the organisms and 5.0 carbolic acid is added. From two to three cubic centimeters of this vaccine is given to adults, the dosage for children being proportionally less. No marked reaction follows and immunity appears to be rapidly established and which lasts for over a year.

The vaccine may also be made by growing the bacillus on agar plates, washing them off with normal salt solution and sterilizing in the ordin-

nary way. Allen (Vaccine Therapy, Third edition, page 269) in referring to Haffkine's experiences says: "He also asserts—(1) that if in a European an attack subsequently occur, it always ends in recovery; (2) that inoculation is applicable to persons already infected and incubating the plague, and that thereby symptoms are altogether prevented or at least much mitigated; (3) that in natives the degree of immunity conferred appears to last through several outbreaks, whilst in Europeans it does not seem to have yet disappeared during the ten years since the inauguration of the method.

The general opinion in India is that absolute safety is insured for at least three months. As with antityphoid inoculation, a second administration of the vaccine in ten to fourteen days appears to confer an additional immunity by stimulating the production of a larger proportion of opsonins.

HYDROCELE.

The treatment of hydrocele has generally been directed towards introducing some chemical irritant into the tunica vaginalis for the purpose of obliterating the sac.

Dr. S. Mallannah (*British Medical Journal*, Jan. 27, 1912) made bacterial examinations of the hydrocele fluid in many cases but usually found it sterile. In one case of ten years' standing which had been tapped twelve times, he found

the bacillus pyocyaneus from which he prepared a vaccine and injected into the evacuated sac 25,000,000 killed organisms. This resulted in an intense inflammatory reaction with much swelling and a temperature ranging from 101 to 103 degrees for several days. The swelling remained for about a month and then began to subside resulting in a complete cure about two months later. A year later no symptoms of a return of the hydrocele was noticeable.

The good results obtained in this case induced the doctor to use the vaccine treatment in twelve other cases. He injected a vaccine from 5,000,000 to 10,000,000 staphylococcus pyogenes aureus direct into the sac. In some cases the fluid was withdrawn before the vaccine was injected and in others the fluid was allowed to remain. The results obtained in these cases were similar to that in the cases of bacillus pyocyaneus infection, showing at least that there are possibilities of good in the vaccine treatment of hydrocele not obtainable by other methods.

MUMPS.

Mumps is one of those contagious diseases which, when occurring in children, runs a comparatively mild course, while in adults it often causes quite a serious illness. I have seen cases in both men and women with a temperature of 105 degrees, and other indications of severe illness. I have in mind a physician who was in bed most of the time for six weeks with an attack of mumps and it re-

quired several months after he was able to be around to regain his former health. Various authors describe the organism causing mumps as a gram positive diplococcus that grows best on agar mixed with sterilized saliva.

From a general application of the principles of vaccine therapy it would appear that this disease should be amenable to the vaccine treatment. Since men who have not had the mumps seem to be particularly subject to this disease, they should have the advantage of prophylactic immunization where they are exposed when the children of the household have the disease. The doctor referred to above, contracted the disease from his little daughter, and a prophylactic inoculation of mumps vaccine might have avoided much suffering and loss of time.



CHAPTER XXXVI.

Therapeutic Index.

WHILE bacterial vaccines are specific curative agents of known value, it is well for physicians to consider them as adjuncts, and to associate with their use the usual orthodox treatment.

Vaccines stimulate the immunizing mechanism of the blood, but they will not contract a dilated stomach, unload an atonic bowel or remove a purulent exudate.

Vaccines serve their purpose only when the body is capable of reacting. If the patient can run a temperature he can produce an opsonin.

The best time to give a bacterial inoculation is early in the course of a disease. If, perchance, an injection should be given with no positive bacteriological reason, no harm will have been done. The earlier such treatment is instituted the better the results are likely to be.

The following Therapeutic Index is purely suggestive. It is the result of many years experience with vaccines, covering thousands of inoculations. One must not suppose that the vaccines here indicated are invariably the right ones to use. Probably nine times out of ten the selection will be the best. It should be remembered that vaccines are not toxic and no harm can follow the

administration of a standard dose, whether it fits the conditions that may be present or not.

Note. To facilitate matters, noughts are omitted—the figures given always refer to millions. Where two or more vaccines are mentioned in connection with any condition, their given order indicates their therapeutic importance.

ABBREVIATIONS.

For the sake of compactness the following abbreviations have been made:

Strep.	Streptococcus pyogenes.
Strep. alb.	Staphylococcus pyogenes albus.
Strep. erysip.	Streptococcus erysipelatis.
Staph. alb.	Staphylococcus pyogenes albus
Staph. aur.	Staphylococcus pyogenes aureus.
Pneumo.	Pneumococcus.
Colon	Bacillus Coli Communis.
M. Catarrh.	Micrococcus Catarrhalis.
Gon.	Diplococcus gonorrhea of Neisser.
B. Typh.	Bacillus Typhosus.



Name of Diseases	Suggested Bacterial Vaccines.
Abscess	Staph. aur. & alb. each 200 to 600. Staph. aur. 200 to 600. Staph. alb. 200 to 600.
Acne (pustular)	Staph. aur. & alb. each 200 to 600. Staph. alb. 200 to 600.
Acne (with comedones)	Acne bacillus 5 to 40; Staph. aur. & alb. each 125 to 600.
Adenitis	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Adenitis mesenterica	Strep. & Pneumo. each 30 to 100. Staph. aur., alb., citreus & Colon each 60 to 200.
Albuminuria (usually)	Colon 40 to 80; Strep. & Pneumo. 30 to 60. Bacterial examination of urine necessary to determine organisms present.
Alveolitis	See Pyorrhea.
Anemia	Colon & Pneumo. each 40 to 80; Strep. 30 to 60 As a tonic.
Angina	Strep. 30 to 60. Strep. 30; Staph. aur. & alb. each 100.
Aphthae	Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. each 100 to 200.
Appendicitis	Colon 40 to 80; Pneumo. 40 to 80; Strep. 30 to 60.
Arthritis	See Rheumatism
Arthritis deformans	Strep. 30 to 60; Staph. aur. & alb. 100 to 200.
Asthma	Strep. 30 to 60; Pneumo. 40 to 60; M. Catarrh. 100 to 200. Bacterial examination of sputum should be made to determine organisms present.
Auto-Intoxication	See Colitis

Boils	Staph. aur. & alb. each 200 to 600. Staph. aur. 200 to 600.
Bright's disease	Colon 40 to 80; Pneumo. 40 to 80; Strep. 30 to 60. Bacterial examination of urine necessary to determine organisms present.
Bronchitis	Pneumo. 40 to 80; Strep. 30 to 60; Staph. aur. & alb. each 100 to 200. Pneumo. 40 to 80; Strep. 30 to 60; M. Catarrh. 100 to 200.
Bronchitis (chronic)	Pneumo. 40 to 80; Strep. 30 to 60; M. Catarrh. 100 to 200. Bacterial examination necessary.
Broncho-Pneumonia	Pneumo. 30 to 60; Strep. 20 to 40. Pneumo. 40 to 80; Strep. 30 to 60; Staph. aur. & citrus each 100 to 200.
Burns (and scalds)	Staph. aur. & alb. each 100 to 200; Strep. 30 to 60.
Carbuncles	Staph. aur. & alb. each 200 to 600. Staph. aur. 300 to 600.
Catarrh	Pneumo. 40 to 80; Strep. 30 to 60; Staph. aur. & alb. each 100 to 200. Bacterial examination advisable to determine organisms present.
Cerebro-spinal meningitis	Meningococcus vaccine Prophylactic; three doses at five to seven day intervals. First dose 250 to 500; Second dose 500 to 750; Third dose 1,000.
Cervical adenitis	See Adenitis
Cervical catarrh	See Metritis
Cervicitis	See Metritis
Cholecystitis (acute)	Colon 40 to 80; Pneumo. 40 to 80; Strep. 30 to 60. Colon 40 to 100.
Cholera (Asiatic)	Cholera spirillum vaccine.

Colitis	Colon 40 to 100. Colon 40 to 80; Pneumo. 40 to 80; Strep. 30 to 60.
Comedones	See Acne
Conjunctivitis (acute)	Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. each 100 to 200.
Conjunctivitis (chronic)	B. Friedlander 100 to 300; B. lacunatus 100 to 300.
Conjunctivitis (gonorrheal)	Gon. 50 to 200.
Consumption (mixed infections)	Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. each 100 to 200. Strep. 30 to 60; Pneumo. 40 to 80; M. Catarrh. 100 to 200. Bacterial examination advisable to determine organisms present.
Corneal Ulcer	Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. each 100 to 200.
Coryza	See Catarrh.
Cystitis	Colon 60 to 200; Staph. aur., alb. & citreus each 60 to 200. Strep. 30 to 100; Pneumo. 30 to 100. Bacterial examination of urine to determine organisms present.
Dacryocystitis	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Dermatitis	Staph. aur. & alb. 200 to 600. Strep. 30 to 60; Staph. aur. & alb. 100 to 300.
Diabetes (Carbuncles in)	Same as ordinary carbuncles.
Duodenitis	Colon 60 to 200; Staph. aur., alb., & citreus each 60 to 200. Pneumo. 30 to 100; Strep. 30 to 100.

Eczema (acute weeping)	Staph. aur. & alb. each 200 to 600.
Eczema (chronic)	Staph. aur. 40 to 1,000. In some cases only.
Empyema	Pneumo. 40 to 80; Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Endocarditis	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Endometritis	See Metritis.
Epididymitis	Gon. 50 to 200; Staph. alb. 200 to 800. Gon. 50 to 200.
Erysipelas	Strep. Erysip. 20; Staph. alb. 100.
Erythema	Staph. aur. & alb. each 200 to 400.
Ethmoiditis	Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. each 100 to 200. Strep. 30 to 60; Pneumo. 40 to 80; M. Catarrh. 100 to 200.
Excoriation	Staph. aur. & alb. each 200 to 400.
Felon	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Fistula	Staph. aur. & alb. each 300 to 600. Strep. 30 to 60; Staph. aur. & alb. 100 to 200.
Fistula (rectal)	Colon 50 to 200; Staph. aur., alb. & citreus each 60 to 200. Strep. 30 to 100; Pneumo. 30 to 100.
Folliculitis	Staph. aur. & alb. each 200 to 600. Staph. aur. alb. & citreus each 100 to 200.
Furunculosis	Staph. aur. & alb. each 200 to 600.
Gangrene	Strep. 30 to 60.

Gastritis	Strep. 30 to 60; Pneumo. 40 to 80; Colon 40 to 80. In those forms due to infections.
Gleet	Gon. 50 to 400; Staph. alb. 200 to 1,600.
Gonorrhea	Gon. 20 to 100.
Gonorrhea (chronic)	Gon. 50 to 400; Staph. alb. 200 to 1,600. Bacterial examination of urine and discharge advisable to determine all the organisms present.
Gonorrheal rheumatism	Gon. 100 to 400.
Gout (rheumatic)	Same as Chronic Rheumatism.
Hay fever	Strep. 30 to 60; Pneumo. 40 to 60; Staph. aur. & alb. each 100 to 200. To immunize against these organisms as complicating factors.
Hepatitis	See Cholecystitis.
Infected wounds	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Influenza	Pneumo. 40 to 80; Strep. 30 to 60; M. Catarrh. 100 to 200. B. Influenza 20 to 100.
Impetigo	Staph. aur. & alb. each 200 to 800. Staph. aur. 300 to 600.
Iritis (gonorrheal)	Gon. 100 to 200.
Iritis (rheumatic)	Strep. 30 to 60.
Ischio-rectal abscess	Colon 60 to 200; Staph. aur., alb. & citreus each 60 to 200. Pneumo. 30 to 100; Strep. 30 to 100.
Jaundice	Colon 40 to 80; Strep. 30 to 60; Pneumo. 40 to 80.
Keratitis	Pneumo. 40 to 80; Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.

La Grippe	See Influenza and Catarrh.
Lobar pneumonia	Pneumo. 30 to 60; Strep. 20 to 40. Pneumo. 40 to 100.
Leucorrhœa	See Metritis.
Leucorrhœa (gonorrhœal)	Gon. 50 to 100; Staph. alb. 200 to 1,600. Gon. 50 to 400; Staph. alb. 200 to 1,600; Colon 30 to 200.
Mastitis	Staph. aur. & alb. each 200 to 600. Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Mastoiditis	Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. each 100 to 200. Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Measles (Pneumonia in)	Pneumo. 30 to 60; Strep. 40 to 80.
Meningitis (in Pneumonia)	Pneumo. 30 to 60; Strep. 40 to 80.
Meningitis (cerebro-spinal)	Meningococcus 250 to 1,000. Prophylactic. Three doses at five to seven day intervals. First 250, second, 500 to 750 and third 1,000.
Metritis	Colon 50 to 200; Staph. aur., alb. & citreus each 60 to 200; Strep. 30 to 100; Pneumo. 30 to 100.
Muco-membranous colitis	See Colitis
Myelitis	Staph. aur. & alb. each 100 to 200; Strep. 30 to 60.
Nephritis	See Bright's Disease.
Neuritis	Strep. 30 to 120.
Ophthalmitis	Strep. 30 to 60; Staph. Aur. & alb. each 100 to 200. Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. each 100 to 200.
Orchitis	Gon. 20 to 100.

Osteomyelitis	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Otitis Media	Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. each 100 to 200. Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Ovaritis	Same as Metritis.
Ozena	Bacillus Ozena 25 to 200. B. Friedlander 100 to 300; M. Catarrh. 100 to 200; Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. 100 to 200.
Panophthalmitis	See Ophthalmia.
Pelvic infections	Same as Metritis.
Pelvic infections (gonorrheal)	Gon. 50 to 200; Staph. alb. 200 to 800; Colon 40 to 100.
Peritonitis	Strep. 30 to 60; Pneumo. 40 to 80; Colon 40 to 80. Colon, 60 to 200; Staph. aur., alb. and citreus each 60 to 200. Pneumo. 30 to 100.
Pertussis	Pertussis bacillus 50 to 100
Pharyngitis	Pneumo. 40 to 80; Strep. 30 to 60; Staph. aur. & alb. each 100 to 200. Pneumo. 40 to 80; Strep. 30 to 60; M. Catarrh. 100 to 200.
Phlebitis	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Pleurisy	Pneumo. 40 to 80; Strep. 30 to 60; Staph. aur. & alb. 100 to 200.
Pneumonia	See Lobar Pneumonia (or Broncho-pneumonia).
Proctitis	Colon 60 to 300; Staph. aur., alb. & citreus each 60 to 200. Strep. & Pneumo. each 30 to 100.

Prostatitis	Strep. 30 to 60; Pneumo. 40 to 80; Colon 100 to 200; Staph. aur. & alb. each 100 to 200. Strep. 30 to 60; Pneumo. 40 to 80; Colon 100 to 200. Colon 40 to 200.
Prostatitis (gonorrheal)	See Chronic Gonorrhea.
Puerperal fever	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200. Strep. 30 to 60; Colon 40 to 80; Pneumo. 40 to 80.
Pulmonary abscess	See Empyema.
Pyelo-nephritis	Colon 60 to 200; Strep. 30 to 60; Pneumo. 40 to 80. Colon 60 to 200; Staph. aur., alb. & citreus each 60 to 200. Strep. 30 to 100; Pneumo. 30 to 100. <small>Bacterial examination of urine should be made to determine all the organisms present.</small>
Pyemia	Staph. aur. & alb. each 200 to 600. Staph. aur. & alb. each 100 to 200; Strep. 30 to 60.
Pyorrhea	Staph. aur. & alb. each 200 to 600. Staph. aur. & alb. each 100 to 200; Strep. 30 to 60; Pneumo. 40 to 80.
Rheumatism (acute)	Strep. 30 to 100.
Rheumatism (chronic)	Strep. 30 to 100; Staph. aur. & alb. each 100 to 300.
Rhinitis	Same as Catarrh.
Salpingitis	Same as Metritis.
Salpingitis (gonorrheal)	Gon. 50 to 400; Staph. alb. 200 to 1,600. Gon. 50 to 400; Staph. alb. 200 to 1,600; Colon 30 to 200.
epsis	See Pyemia

Sinusitis	Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. each 100 to 200. Strep. 30 to 60; Pneumo. 40 to 80; M. Catarrh. 100 to 200.
Sepsis (puerperal)	See Puerperal Fever.
Surgical (prophylactic)	Strep. 30 to 60; Staph. 100 to 200.
Surgical (prophylactic abdominal)	Strep. 30 to 100; Pneumo. 30 to 100; Colon 60 to 200; Staph. aur., alb. & citreus each 60 to 200.
Scarlet Fever	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200. Strep. 30 to 60.
Small Pox	Staph. aur. & alb. each 100 to 200; Strep. 30 to 60. To avoid excessive infections of the pustules by pus organisms.
Sycosis	Staph. aur. & alb. each 100 to 200.
Tonsillitis	Strep. 30 to 60; 40 to 80; Staph. aur. & alb. each 100 to 200. Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Thrombo-phlebitis	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Tooth-ache (germ-boils)	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Tuberculosis (mixed infection)	See Consumption.
Typhoid (therapeutic)	B. Typh. 100 to 1,000.
Typhoid (prophylactic)	B. Typh. 500 to 1,000. Prophylactic three doses at five to seven day intervals. First 500, second and third each 1,000.
Ulcers	Staph. aur. & alb. each 200 to 600.
Urethritis (acute)	Gon. 20 to 100. Gon. 20 to 100; Staph. aur. & alb. each 100 to 200.

Urethritis (chronic)	See Gonorrhea.
Ulcerative Keratitis	Pneumo. 40 to 80; Strep. 30 to 60; Staph. aur. & alb. 100 to 200.
Uveitis	Strep. 30 to 60; Staph. aur. & alb. 100 to 200. Strep. 30 to 60; Pneumo. 40 to 80; Staph. aur. & alb. each 100 to 200.
Vaccination (Smallpox)	Staph. aur. & alb. each 200 to 600. <small>Pus organisms infecting the wound same as in wound infections.</small>
Vaginitis (gonorrheal)	Same as Leucorrhea.
Vertigo	Strep. 30 to 60. Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Vesiculitis	See Gonorrhea.
Vulvitis	Gon. 20 to 100. Gon. 20 to 100; Staph. aur. & alb. 100 to 200.
Wounds (prophylactic)	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200.
Wounds, abdominal (prophylactic)	Strep. 30 to 60; Staph. aur. & alb. each 100 to 200; Colon 40 to 80.
Whooping cough	See Pertussis.
Whooping cough (Pneumonia in)	B. Pertussis 50 to 100; Pneumo. 30 to 60; Strep. 20 to 40.



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